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Editorial Notes

Keep the Industry Intact

THE war will bring many changes and necessarily many difficulties to the manufacturers of gas making plant, gas using equipment, and all the numerous accessories and fittings required for efficient gas service. It is well known that several firms serving the Industry are already engaged on munition work, and doubtless many more will be called upon to change over from the manufacture of normal peace-time plant and equipment to the provision of components for armaments and plant for the production of materials for munitions. It is certain that good use will be found for the high-precision and other specially developed machines and tools in the makers' workshops and that advantage will be taken of the varied specialized technique developed and knowledge acquired by those who serve the Gas Industry so efficiently.

It is certain, too, that in the transition period from peace to full war conditions the burdens which some firms will have to shoulder will be greater than those of others and that some firms will be hard hit. Quite apart from the fellow-feeling which exists within all branches of the Industry, and which would naturally prompt co-operation as far as possible, it is clearly essential that we must all make every effort to maintain as far as is possible the stability, status, and efficiency of the many contracting firms, both large and small, which have served and are serving the Gas Industry. We should strive to attain such a state of affairs that when the war is ended the Industry can count on having its needs met and its requirements fulfilled as speedily and with as little dislocation as possible. Entirely new problems of both a technical and an economic nature will arise and will have to be faced. Their solution will be all the easier and all the more satisfactory through co-operation, and those firms which are hardest hit will gain added strength in coping with their difficulties if they know that all is being done to help them which can be done. Apart, then, from any sentiment, it is a sound economic business proposition to put forward every endeavour to maintain intact as a working unit the firms within the Industry.

Practical Suggestions

LET us see, then, whether any practical courses lie open to the various components of the Industry whereby they can foster this very desirable co-operation. In the first place we may take it for granted that gas undertakings will continue to place with their old suppliers such orders as may still be available, and thus cause as little disturbance of normal business as possible. But we suggest they may go further than this, and give every opportunity to their old friends to satisfy their requirements even outside the usual run of gas plant and gas appliances. We do not know what special war requirements they may have, what plant or fittings, in no way connected with normal gas production, may be imposed upon them by regulations present and future. But we do know that a vast array of excellent tools and machinery, of high technical knowledge, and of skilled labour are available in the workshops of the Industry, which also house some of the finest foundries in the country, and that those firms which are normally employed in the making of gas plant and appliances could readily turn over to other work.

We do earnestly commend this line of thought to gas undertakings everywhere. If they have to buy something which they have not previously required, let them consider whether it could not be turned out by a Gas Industry firm equally well as by a stranger. If they can do so, and other things being equal, they will in this way be doing much to keep our own Industry intact.

Mutual Help

ANOTHER line of attack which suggests itself strongly is for mutual help among the contracting firms themselves. The "heavy" and "light" sides can undoubtedly get together to some extent in this way. Circumstances must arise when some firms will have to let sub-contracts to others specializing in various parts of equipment. Those who are responsible for this sub-letting of contracts will, it is to be hoped, give first thought to other firms within the Industry.

We have in mind particularly that the makers of meters, domestic appliances, &c., may be hit, at any rate initially, by the mere fact that a gas "ration" is to be imposed, and by the uncertainty which at the moment surrounds its effects. We hope and believe that this will adjust itself in due course, for the obvious reason that appliances which are the most economical in use must eventually be in great demand for the replacement of obsolete types. If, then, a contractor on the gas producing or processing side is full of work—whether it be new plant, repairs, or maintenance—and consequently has something to sublet, or parts or fittings which he cannot conveniently turn out himself, we feel sure he will give first consideration, other things being equal, to any recognized Gas Industry firm which can efficiently supply him.

As we have said, we must keep the Industry together not only because it is a national asset of vast importance, but

also in our own interest, both present and future. It possesses first-rate plant and machinery, and we have suggested ways by which none of it, so far as is possible, shall lie idle in the present emergency. In the Society of British Gas Industries there exists an admirable organization for such co-ordination of effort, and we have the assurance of the Society that they will welcome wholeheartedly any opportunities of using their special knowledge for furthering such co-operation. In this, and in many other ways, in collaboration with the other national bodies, the Society will continue to play in war as it played in peace-time a most important part in preserving the solidity and fortifying the purposes of the Gas Industry. In this particular aspect of co-operation it has a specific role, and if any gas undertakings which see the force of our arguments are uncertain how to proceed, we can assure them of every sympathetic help if they put themselves in touch with Mr. M. W. Burt, the Manager and Secretary, at "Uplands," Epsom Road, Guildford.

Toluol Production

THE Gas Industry has been told by the Government to produce, by stripping gas, as much toluol as possible as a material for the manufacture of high explosives. Gas undertakings throughout the country are responding to the best of their ability to this demand, as also, of course, are the coke oven plants, which are capable of maximum production. For the purpose, a high quality product is needed, so that losses on subsequent nitration are minimized. How important, therefore, that the plant installed should be not necessarily the cheapest, but the most efficient. Haphazard choice of plant can well defeat the purpose of maximum extraction of toluol from the gas produced, and the policy that the unit selected shall be the cheapest in first cost is, to say the least, a very short-sighted one. There is a wide margin between the working efficiencies of plants, and due account should be taken of the fact. Also, extraction plant requires proper control and supervision, and this carries with it the corollary that there should be retained by the Industry an adequate supply of men scientifically trained and with a thorough grasp of the technique. The Industry did a great deal in the matter of toluol production during the last war. It has better facilities now to render still greater service to the nation in this direction.

Rationing of Gas

THE question is being discussed as to the ultimate advisability of rationing gas. The Gas Industry is doing and will continue to do all in its power to meet the demands made upon it by the Government. It certainly has no desire to create difficulties in this transition period between peace-time and war-time conditions. On the outbreak of hostilities the Government assumed vast powers, and quick decisions were made on innumerable aspects of national life. Rationing of gas was one of them; but it may be queried whether such a step is likely to prove to be in the best national interest. Perhaps after fuller consideration of the whole problem it will be found wiser to modify the decision.

There can be no doubt at all that gas consumers will exercise the most rigid economy in its use. Force of circumstances will put a check on any form of waste. But it would seem more logical that the public should be encouraged to substitute gas and coke for coal rather than that they should be strictly rationed in each. There must be countless instances where this substitution could be effected with benefit to the consumer. We are looking at the matter broadly from the viewpoint of making the best use of coal, which is the nation's greatest asset. The Government is calling upon the carbonizing industries for the maximum supply of material for the manufacture of high explosives. The Gas and Coking Industries are responding to the demand. It is obvious, though, that the possible output by the Gas Industry is directly proportional to the quantity of gas sold, and that the effect of rationing gas will be to set a limit to the available supply of toluol by gas undertakings—a limit lower than that which would have been possible of achievement in peace-time.

It is not, however, toluol only that the country needs from the Gas Industry in time of war. Benzole is required for motor transport. A limit is set to the output of this, too, by the rationing of gas. Then there is tar, from which a large number of necessary chemicals is obtained; and for agriculture sulphate of ammonia will certainly be needed. Rationing of gas, it is evident, is a problem regarding which decision cannot justifiably be taken as though it was a straightforward issue of economy at the gas burner. As we have said, straitened circumstances will prevent waste in this direction, but it must surely be in the best interest of the nation that coal should be used wisely and that the valuable products which it contains and will yield on carbonization should be put to good use. That is true national economy, as contrasted with the burning of raw coal in the domestic hearth, which practice must be regarded now more than ever as national waste.

"Business as Usual"

WE are all asked to carry on, as far as is practicable, as though nothing had happened. The "JOURNAL," with all others, is endeavouring to give concrete answer to this request. We certainly know that gas undertakings throughout the country, together with the many contracting firms which supply the industry with gas making plant and other equipment, are putting forward their best efforts towards this end. We are rationed here, rationed there. We shall doubtless be rationed everywhere. We do not grumble or grouse about it—that goes without saying. But in some cases rigid rationing and "business as usual" are hardly compatibles.

An instance is provided by the petrol ration and the services which are expected from and are rendered by the makers and erectors of carbonizing and other gas-works plant. These firms employ a considerable staff of men—all of them technical and specialist—whose duties are concerned not only with the design and construction, but also the operation and servicing of gas plants and coke ovens. Their work, which must be classed as essential, necessitates a good deal of travelling. They are engaged in the efficient working of hundreds of plants in England and Wales and in Scotland, which are essential to the prosecution of the war, and to operate effectively they need motor transport. In many cases other methods of transit would be impracticable or would entail such delays as would render their services of little use. By road they may well be able to answer a number of calls for their assistance in the same time as only one by train.

These men constitute an important link in the chain of gas service—a service obviously of first-rate importance to the home, to industry, and to the nation. We suggest that they should be carefully and specially considered in the matter of allowances of petrol to enable them to meet the calls made upon them. They are part and parcel of an essential public utility, and the circumstances of their occupation justify—and we think will receive—this special consideration. Granted it, we shall be more secure in "business as usual."

Priorities

As we anticipated a fortnight ago the Minister of Supply has so far modified the conditions governing the control of iron and steel as to include the Gas Industry (along with other public utility undertakings) in the list of exemptions from the necessity of procuring licences before being able to purchase supplies of these metals. Appended to the Control of Iron and Steel (No. 2) Order is a direction defining existing exemptions and adding gas, electricity, and water undertakings to the list, but only "for repair work and maintenance work for the purpose of the undertaking." Producers of refractory materials are also added to the list, with

similar limitations, and in each case contractors and sub-contractors to the exempted undertaking are included in the exemption. For the time being, therefore, manufacturers of plant and appliances not coming within the scope of repair and maintenance are subject to the licensing regulations and must "hold," even though they need not produce, licences before supplies can be obtained. Apart from the exclusion of scrap, the first schedule, which sets out the materials covered by the Order, is very much the same as in the original Order, but there are a few important revisions in the description of some of the raw materials and products. The Minister has also issued the Control of Iron and Steel (No. 3) (Scrap) Order prohibiting the purchase of scrap iron and steel except by licence, to which is added a direction confining the operation of the present Order to certain special scrap steels.

War Risks Insurances

By order of the Board of Trade certain goods have been declared to be uninsurable under Part II of the War Risks Insurance Act, 1939. Many of the goods so declared are used by the Gas Industry, which thereby obtains what can only be regarded as reasonable relief. Among these goods are coal (including anthracite and cannel coal) and coke and manufactured fuel of which coal or coke is the chief constituent; iron and steel scrap; bricks and refractory bricks, blocks, and tiles; cinder, scale, and slag and iron and steel of certain descriptions, including pipes and hot finished tubes, sectional material, whether fabricated or not, and structural work, including bridge, pier, tank, and plate work while at producers' works. Castings, blocks for forging, blocks for pressings, forgings and stampings (except where wholly or partially machined), and pressings are also uninsurable under the Act.

Central Control of Lighting

For the time being the Home Office remains adamant—and many think rightly so—in regard to the total elimination of normal street lighting, as distinct from special hooded signs to mark refuges and danger points. The opinion is held by some, however, that the present total blackout should be to some extent modified in order to lessen the danger of travel on the roads and to relieve the detrimental effect on shopping and amusements. One objection to any material relaxation of existing conditions is the possible effect upon householders, who might tend to become less careful in the screening of their own lighting, where a complete blackout must be maintained. For that reason any substantial return to peace-time street lighting would be undesirable. It is clear that whatever modified form of public lighting may be permitted it must be capable of immediate extinction. In this regard, however, central control of gas lighting has for years been proved to be a satisfactory proposition. Pressure wave control has been in use in several places for a long time. Gas undertakings should be *au fait* with the means at disposal for the central control of gas lighting and in a position to discuss its application.

Forthcoming Engagements

Oct.

6.—I.G.E.—Joint Committee on Complete Gasification under Pressure, 14, Old Queen Street, S.W. 1, 3 p.m.

9.—I.G.E.—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.

10.—I.G.E.—Council, 10 a.m.

11.—I.G.E.—Board of Examiners, 2.30 p.m.

17.—I.G.E.—Gas Education Executive Committee, 2.30 p.m.

26.—S.B.G.I.—Meeting of Emergency Committee, Banbury, 2 p.m.

26.—Wales and Mon. Association.—Annual Meeting at Cardiff.

27.—Coke Oven Managers' Association.—Annual Meeting, Royal Station Hotel, York, 11.45 a.m.

Nov.

8.—Southern Association.—General Meeting, Hotel Victoria, W.C. 2.

"Gas Journal" Directory

In order that readers may be able to keep the particulars contained in the "JOURNAL" Directory up to date, we summarize in the following list various changes of which we have been notified during the past month:

Page 92. RENFREW. W. Currie appointed E. & M. *vice* D. S. Munn retired.

„ 88. KIRRIEMUIR. S. C. Coubrough appointed M. *vice* J. Duncan, retired.

Wales and Monmouthshire Association

The Wales and Monmouthshire Association of Gas Engineers and Managers have decided to hold their Annual Meeting, which was to have taken place at Porthcawl on Sept. 21, at Cardiff on Oct. 26.

Personal

Their many friends in the Gas Industry will be delighted to hear that on Sunday next, Oct. 8, Sir H. W. Russell Bencraft and Lady Bencraft will celebrate their golden wedding. Sir Russell, who is widely known throughout the Industry—he was President of the British Commercial Gas Association in 1926-27—is Chairman of the Southampton Gaslight & Coke Company.

* * *

Mr. A. B. BRITTON, Engineer, Manager and Secretary of the Hinckley Gas Department, has been appointed Chairman of the Hinckley Urban Fuel Advisory Committee.

* * *

Mr. JACK BRITTON, a student of the Leicester Technical College, and eldest son of Mr. A. B. Britton, Engineer, Manager and Secretary of the Hinckley Gas Department, has obtained his National Engineering Certificate (Ordinary Grade) in the examination set by the Institution of Mechanical Engineers. He was one of eight successes out of a class of over sixty.

* * *

The engagement was announced last week of Edward Lawrence, youngest son of Mr. and Mrs. H. C. Bradby, of Ringshall End, Berkhamsted, and Bertha, youngest daughter of Mr. and Mrs. Henry Woodall, of Yotes Court, Mereworth, Maidstone. The marriage is to take place early this month.

* * *

Mr. STEWART C. COUBROUGH, who has been collector and inspector for the past three years to the Kirriemuir Gas Company, was appointed Gas Manager by the Directors of the Company on Sept. 28. He thus succeeds Mr. John Duncan, who has retired after 40 years' service. A son of Mr. A. Coubrough, formerly Gas Manager at Alyth, Perthshire, Mr. Coubrough was employed at the gas-works at Kaibworth Beauchamps in Leicestershire. An elder brother is Gas Manager at Biggar, Lanarkshire.

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Councillor E. C. A. BLIAULT, Managing Director of the National Gas Water Heater Company, who is a member of the Ealing Borough Council, has been appointed a member of the Special Civil Defence Committee for Ealing.

* * *

Mr. THOMAS CROWDY, Gas and Water Engineer and Manager to the Kendal Corporation, has been appointed Chairman of the local Fuel Advisory Committee.

Obituary

Mr. J. WILFRID DRAKE, a member of the Board and a former Chairman and Managing Director of Messrs. Drakes, Ltd., of Halifax, died on Sept. 29 after a very long illness. Mr. Drake was in his 57th year. The interment was at All Saints Cemetery, Dudwell, Halifax, on Tuesday.

News of the Week

The Autumn Meeting of the Society of British Gas Industries, which was to have been held on November 23, has been cancelled.

Expenditure Totalling £1,500 has been approved by the Blackburn Corporation Gas Committee for A.R.P. protection of the gas-works at Greenbank.

Hire Purchase is to be Suspended by the Accrington and District Gas Board for the time being, the matter to be the subject of an early report by the Engineer and Manager (Mr. A. J. Harrison).

No Lack of Interest was shown by audiences in gas cookery demonstrations during wartime, held at the St. Helens Gas Showrooms, at which Miss Eccles, C.D.S., demonstrated with Cannon cookers with "Autimo" control.

According to a Report from Accrington, the Ministry of Mines has stated that where gas supplies are obtained from coke ovens the local Fuel Overseer can grant, in appropriate cases, a greater allowance than the 75% for domestic purposes on the grounds that otherwise gas produced at the coke ovens would have to be blown to waste.

It is Regretted that owing to the present international situation, the Dinner and Dance of the Society of Engineers arranged for November 4, has had to be cancelled. The Gas Light & Coke Company also regretted having to cancel the visit of the Society which was to have been made to their works at Beckton on September 2. For the time being no ordinary meetings of the Society will be held.

Owing to Shortage of Staff caused by employees having been called up for military service, the Penrith Gas Department is to approach ex-employees regarding the possibility of their rendering further service in the emergency. The showroom has been closed for the time being, and all accounts must be paid at the Town Hall.

It Would Cost the Gas Department of the Blackpool Corporation £4,000 a year to make up the difference in wages if all employees between the ages of 18 and 41 were called up to the armed forces and received the lowest Army pay. These figures are from a report just issued which, however, points out that this total is the maximum, and having in view the number of men likely to go the figure would probably be halved. Including every department in the Corporation the annual amount would be £77,000.

A Previous Decision to make up the difference in the pay of employees called up for service in their normal wage has been rescinded by Accrington District Gas Board. Councillor R. I. Constantine said in times like these sacrifices should be equitable. This proposal would create an anomaly in that men fighting side by side would receive widely varying amounts, yet they were running equal risks and shouldering equal burdens. If small employers adopted this policy they would soon be bankrupt. This burden would fall on local ratepayers who had about as much as they could stand. Alderman Tetlow said they should keep men's jobs open for them, and their superannuation should not suffer; but it was not right to other soldiers that they should receive several pounds per week while others got 2s. a day.

Gas for Motor Transport

The Huddersfield Corporation Gas Department have set up, at the works in Leeds Road, a filling station for gas as a motor fuel.

The Liverpool Gas Company have equipped an 8 h.p. motor car to operate on town gas. Fitted to the roof of the car is a framework to carry a gas container which will hold 400 cu.ft. This car was demonstrated in Liverpool on Thursday last. It is estimated that one charge of gas will be sufficient for about 50 miles. With gas at 3s. per 1,000 cu.ft. it is estimated that 250 cu.ft., costing 9d., will be the equivalent of one gallon of petrol.

If a demand develops for town gas to operate motor vehicles, the St. Helens Corporation may consider the installation, when possible, of the necessary compressing plant. At present, low pressure supplies carried in bags or balloons on the vehicles are available.

The Eastern Manufacturing Co., of Arbroath, is putting on the market a gas producer for small vans and private cars, which will enable any standard petrol engine to be adapted to run on anthracite or similar fuel without any modification to the engine other than its controls. It is claimed the running costs are only one-fifth of those of petrol.

Gas for motor transport is under consideration by the Middlesbrough Corporation Gas Department. It has been stated that there would be no difficulty in meeting demands for gas for this purpose in Middlesbrough and that the equivalent of four gallons of petrol could be purchased for 2s. 5d.

A Correction

We apologize for an error in the article on "Gas for Motor Transport" published in last week's "JOURNAL." On p. 710 it was stated that a prominent firm specializing in the production of "bottles" for compressed gas was turning them out at a rate of about 12,000 tons a week. In point of fact the output is 1,200 bottles.

Copper Development Association

In case any doubt exists as to the position of the Copper Development Association in the present emergency, it is announced that the Association will for the time being continue its usual activities.

The staff has been reduced to some extent by the calling up of certain members for military service, and it may not be possible for all phases of the Association's work to be carried on as fully as hitherto. Nevertheless, every endeavour will be made to give continued service to all interested in the use of copper and copper alloys, to whom the resources of the Association remain available free of charge.

Enquiries for information should be sent to the Association at its offices in Thames House, Millbank, London, S.W. 1, from which address all its usual publications can still be obtained upon application.

Illuminating Engineering Society

Work to be Continued

A statement in the September issue of *Light and Lighting*—the Official Journal of the Illuminating Engineering Society—announces that the Society is prepared to carry on from its present address at 32, Victoria Street, London, S.W. 1.

For the moment it is unavoidable that meetings arranged for the immediate future should be postponed, but the situation will be reviewed after a couple of months, when the position may be more favourable.

Meantime the I.E.S. is not inactive. Through the agency of a series of sub-committees a variety of problems is being explored, and, it is stated, there will doubtless be an increased demand for the services of members on sub-committees handling these and further problems.

It is hoped to continue the regular publication both of the Transactions and *Light and Lighting*, for which no lack of interesting matter is anticipated.

War Time Changes of Address

In addition to the lists published in previous issues we have been notified of the following changes of address:

J. & J. Braddock.—London Office transferred to Morden Road, Mitcham, Surrey. Phone: Mitcham 2124.

Cannon Iron Foundries, Ltd.—London office transferred to Fairways, Crescent Road, Burgess Hill, Sussex. Phone: Burgess Hill 3216. Correspondence to Head Office at Deepfields, nr. Bilston, Staffs. Phone: Bilston 41241/4.

Electrolux, Ltd.—London offices transferred to Electrolux Works, Luton, Beds. Phone: Luton 1331.

G. A. Harvey & Co. (London), Ltd.—West End office transferred to Works, Woolwich Road, S.E. 7. Phone: Greenwich 0020.

Iron and Coal Trades' Review, 3, Amersham Road, High Wycombe, Bucks. Phone: High Wycombe 1792.

Society of Engineers, c/o, B. B. Tarring, O.B.E., F.S.E., 56, Church Street, Weybridge, Surrey. Phone: Weybridge 376.

British Commercial Gas Association

Activities in War Time

The question of the work that a national publicity and propaganda body such as the B.C.G.A. can usefully perform under war conditions has doubtless been exercising the minds of all the Association's members.

The Association has an organisation at its disposal whereby it can educate and guide the public in the most profitable ways of utilizing the gas ration. Such work is not only useful to the Industry as a whole, but is also welcomed by Government Departments as giving valuable assistance to them.

Further, it is essential that the popularity of the use of gas should be kept alive throughout the war although competitive promotional work must be very much curtailed.

Executive Committee's Decision

A special meeting of the Executive Committee took place on Thursday, Sept. 21, to consider the work which should be performed by the Association on behalf of the Industry during the war. The policy and work outlined in a memorandum which was submitted was fully endorsed by the Executive Committee except in certain points of detail which are subject to further consideration as and when deemed necessary.

The upshot of the decisions taken is that the Association will continue to function within the limits of this memorandum, and members are urged to keep the Association informed of the problems arising from the present circumstances of war, giving also an indication of the methods adopted in dealing with them: the Association can then act as a "pool" of information for the benefit of all.

Journalists are constantly seeking guidance from the Association on the utilization of gas in war-time, and the Association attaches the greatest importance to the Press being fully and accurately informed on these matters. The advisability is suggested of fostering the closest co-operation with local papers and of giving them news of the activities of individual undertakings and of the Gas Industry in general.

Special war-time literature is in course of preparation and will shortly be made available to the Gas Industry. The Studio is fully occupied with suitable National Service window displays, and there is every hope that existing and new Gas Industry films will be freely and usefully employed, especially in reception areas.

The Establishment Committee has made recommendations to the Executive Committee with regard to the staff. It has, unfortunately, been found necessary to curtail the staff since the Association is no longer engaging in major Press campaigns. Every care, however, has been taken to ensure that those whose services cannot be continued until peace is restored are relieved of hardship, if that should arise.

Committees and District Meetings

Travelling renders the peace-time frequency of Committee meetings impossible under present war conditions and the Executive agreed, therefore, that their future meetings and also those of the General Committee should be considerably reduced during the next twelve months. In consequence of this decision, the Committee appointed a war-time Executive Council consisting of the following members, to deal with the Association's current affairs:

Mr. H. D. Madden (Chairman of Executive).

Major F. J. Bywater (Vice-Chairman).

Mr. W. J. Sandeman (Honorary Treasurer).

Mr. A. W. Smith (Past Chairman of Executive).

Mr. David Fulton (Chairman, Management Committee for Scotland).

Mr. Stephen Lacey (Chairman, Finance Committee).

Mr. J. Boxhall James (Chairman, General Services Committee).

Mr. S. C. Leslie (Chairman, Publicity Committee).

Mr. T. P. Ridley (Chairman, Northern District).

Mr. H. Singleton (Chairman, Yorkshire District).

And a representative of the Society of British Gas Industries.

The Executive expressed the view that it would be most desirable to have meetings of members in their respective Districts, as and when circumstances allowed, to consider the commercial aspects of the Industry under war-time conditions and the Association's work in that connexion. This would allow the Association to be kept informed of the needs and requirements of the Districts.

Institution of Gas Engineers

1940 Examinations

Since the outbreak of hostilities most of the Technical Colleges have not reopened, and in consequence several students are in doubt regarding the best course to pursue for the continuation of their studies.

The Institution of Gas Engineers, as already announced, is continuing to administer the Education Scheme, and at present it is hoped to arrange for the holding of Examinations in Gas Engineering (Manufacture) and (Supply) in April and May, 1940, as heretofore.

In the circumstances, students are urged to make every endeavour to continue with their studies, and in many cases it may be possible for them to form small classes of 4 or 5 and obtain tuition privately in their home towns. Internal students of Technical Colleges, if they pursue such a course, will be allowed to take the Examinations of the Institution as External Students.

If any students are in doubt as to their best course of procedure, or if they cannot obtain help from their local Technical Colleges, they should write for further information to the Secretary of The Institution of Gas Engineers.

City and Guilds of London Institute

S.B.G.I. Awards

The Council of the Society of British Gas Industries has again this year awarded prizes in connexion with the examinations of the City and Guilds of London Institute in Gas Supply Practice and Gas Fitting. The examiners report that the examination in Gas-Works Practice has now been discontinued. The list of awards is as follows:

Minor Course in Gas Supply Practice

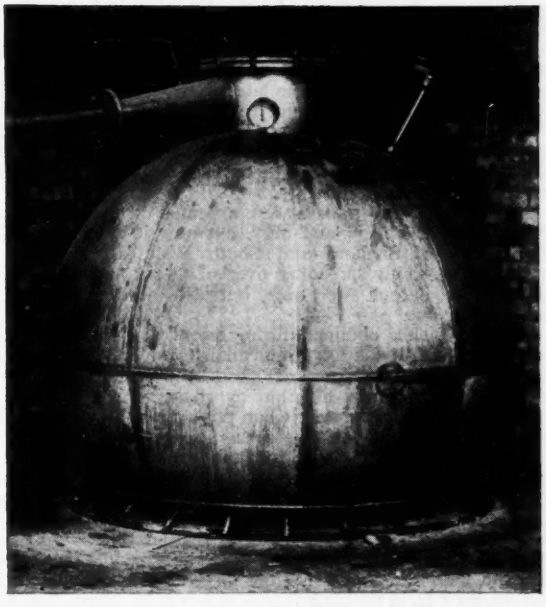
First Prize of £5 5s.: Arthur Limbert, a student of the Leeds Technical College.

Second Prize of £2 2s.: Stanley H. Waddington, a student of Bradford Technical College.

Final Examination in Gas Fitting

First Prize of £5 5s., to be divided equally £2 12s. 6d. each, between the following two candidates: Frank T. Morgan, a student of the Kilmorie Road Evening Institute, London, J. Price, a student of Coventry Technical College.

Second Prize of £2 2s., to be divided equally 14s. each between the following three candidates: Reginald Eales, a student of Westminster Technical Institute, William P. H. Simmons, a student of the Tottenham Polytechnic, Douglas H. P. Hammond, a student of Brighton Technical College.



Our illustration, for which we are indebted to the Co-partnership Journal of the South Metropolitan Gas Company, shows a stainless steel vat of two tons capacity used for heat treatment in the process of oil refining. The equipment was recently installed in a Rotherhithe factory and is one more example of the adaptability of gas to every kind of problem where heat is required

Protective Measures for Gas Undertakings Against a National Emergency

This Paper was to have been read at the General Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers at Porthcawl, on Sept. 21, which meeting had to be cancelled owing to the outbreak of war. It will, of course, be appreciated that this Paper was prepared before the outbreak of hostilities

By J. HAROLD WILLIAMS
of Cardiff

The Great War provided very little experience from which we could draw up precautionary measures, and fortunately we have had very little personal knowledge of modern air raids. Other countries have suffered in this respect, and from them we can only barely judge the probable effects from the larger scale operations that may be expected.

It is my object principally, however, to attempt to acquaint you with the measures taken, or being taken, by the Cardiff Gas Light and Coke Company, rather than deal with any particular aspect of the subject. If every section was treated it would take a whole volume to complete; so I crave your indulgence if you consider I have omitted any matter you consider vital.

We do not suggest that our arrangements are ideal, or final, but we hope they may prove to be somewhat effective should an emergency arise. The arrangements might not suffice to meet all the requirements of other undertakings differently situated, but may be of some guidance or assistance in carrying out individual schemes.

Relative Vulnerability of Areas

I think it is now understood that practically all parts of the country are within the range of bombing aircraft. The recent exercises of the British and particularly the French Air Force over South Wales will prove that. The importance or the attractiveness of the target from a military point of view is *not*, in my opinion, the main criteria in determining whether an area is likely to be bombed. Performance figures of most modern aircraft are kept secret by countries, but it can be taken that the figures for the latest types show a marked improvement in their maximum range, speed, and bomb load. Highly developed navigational and blind flying instruments, enabling safe travel through clouds, darkness, and at high altitudes, are now fitted, allowing machines to reach their objective with great certainty.

A year or so ago attacks were expected on the Eastern and Midland parts of England only, but now it appears that the South-West of England and South Wales are probably as vulnerable. This spreading over of attack would not only divert a lot of our Air Force, but also increase the area of ground defence.

The experience obtained during recent wars has shown that an enemy will attack anything, small town or village, regardless of its military importance, and drop bombs indiscriminately to terrorize and attempt to shatter the morale of an ignorant and unorganized civilian population, and, at the same time, disperse defensive measures.

It would be very unwise for small undertakings not in or close to centres of dense population or industry, to assume, because they are tucked away in apparently quiet spots, that they are immune from attacks. If anything can be seen by bombers, attempts will be made to register hits, if only with a portion of their load, and not, as some people think, keep the full load exclusively for the larger fry. Again, bombers driven back from their main objective will be only too pleased to drop their bombs on any mark on the way home.

Methods of Attack

As regards gas attacks we are, I think, better organized and protected than most countries, and outdoor shelters are gradually—too gradually—being provided. Due to the intensified training we are obtaining in anti-gas measures, there is a danger of many people being misled as to the relative dangers of gas and high explosives with fires. High explosives are definitely the greatest danger, and against them it seems the least precautions are being taken. Spain has shown that the greatest civilian casualties have been due to high explosive bombs. The Government is now giving additional training to already qualified instructors, in methods of protection against high explosives and control of incendiary bombs.

Although poison gas may be regarded as the least likely and least important of aircraft weapons, its use would complicate and might even paralyze any air raid precautions scheme designed only to cope with high explosive and incendiary bombs.

Incendiary bombs have been found to be less effective than was at first believed in the Spanish war, though we must remember that our country has far more industrial and manufacturing concerns, so that incendiaries will certainly be used against special targets such as works, docks, oil, and gas containers. It may be emphasized here that dealing with incendiary bombs is mainly a question of fire fighting and ordinary fire precautions, and much of the information and advice given to men during their training in this section of A.R.P. is equally applicable to peace-time conditions.

Attacks with gas bombs *alone* on a people with a knowledge of gas and defensive measures against it are most unlikely, so the possibility of attacks with high explosives, incendiary, and gas bombs in successive waves must be borne in mind. A modern bomber could easily carry a load of a thousand or more incendiary bombs, and one must not think in terms of a single machine, but in "formations." Gas bombs can be charged with any type of gas. The chargings considered most likely are non-persistent lethal gas like phosgene, and persistent blister gases such as mustard and lewisite.

General Organization and Precautions

The measures first taken at the Cardiff Works were:

1. Immediate A.R.P. training of personnel, particularly engineering staff, and key men such as valvemen, retort-house foremen, exhauster drivers, water gas operators, governor house and boiler men, &c.
2. Decision upon the constructional work to be undertaken immediately, and what work could be safely deferred until war appeared imminent.
3. Provision of shelter and protection for workers.
4. Augmenting all fire-fighting and general equipment.
5. Protection of vital plant as far as possible.

Training of Personnel.—Having a recognized Home Office instructor on our staff, and a sufficient number of employees, the Home Office provided all the important training equipment, and sanctioned and passed the erection of a fixed gas chamber with a supply of tear gas for testing and training. In addition, our Company fitted out a lecture room and A.R.P. stores. Training of engineering staff and key men immediately commenced.

When this section had completed the full course, squads were made up from day workers and mains and service department and fully trained. Separate squads from each shift were also trained; so we are ensured that at any time

during the 24 hours trained shift men are on the works in addition to those squads who are on special duty.

A certain number of men who have passed the full A.R.P. course are being trained for fire-fighting and demolition squads. This further training is being given by the local police and fire brigade departments. Care is being exercised in choosing men who are physically fit for this class of work.

Included in our course is instruction in first-aid for war gas casualties, but men selected for the works first-aid services will receive additional training in collaboration with the St. John Ambulance Brigade or the British Red Cross Society.

Men attend these courses during their working hours, and training is still being continued, though we find it difficult to release and replace certain men for the necessary period each day.

While men are receiving their training it is important to observe their reaction and utility in this class of work. Whereas a man might be good at his own particular job, and has been chosen for training with that in mind, one may be surprised to find that he is hardly suitable for this different class of work, and would possibly cause a serious hitch in your organization in a war-time emergency.

Shelters

We have found it very difficult to decide on sites for shelters owing to the proximity of steam, gas, and water lines, boiler-houses, holders and gas plant in general.

It is hardly necessary to state that, if the personnel of works are well protected against the effects of air raid in order to give security and confidence, production will be maintained at the highest rate, which is an essential part of national service.

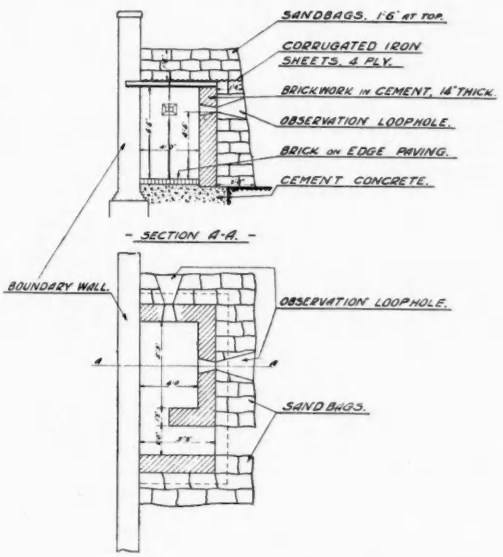


Fig. 1

If shelters are available for men within a short distance of their work, I think it will be found that they will not spend their whole time taking cover during air raid periods, but come back quickly when the "all clear" sounds. Should the shelters be a considerable distance away, men would be excusably reluctant to leave. A sufficient number of shelters must be provided within a reasonable proximity; if this is not so, there may be wholesale unorganized evacuation, or panic leading to gross overcrowding in such few shelters as are available.

Small shelters to accommodate three to six key men have been erected at points nearest to their work, so that any of these men can reach shelter within one minute. These shelters are built according to the Government recommendation, a sketch of which is shown in Fig. 1.

The shelters are erected outside buildings and are provided with observation loop-holes, giving the key men unobstructed view over vital areas. Old hard firebricks, set in cement, were utilized as far as possible in the building of these shelters.

For the use of retort-house foremen and others who will have to remain on duty, in order that the work may continue in operation, sites for shelters inside the buildings have been chosen. This type of shelter is constructed of sandbags, and erected in corners, so as to derive benefit from the extra protection of the adjoining walls, which will be reinforced with sandbags, if necessary. Overhead protection against falling debris will also be given.

Collective Shelters.—It was first thought to utilize the cellar or clinkering stage of the horizontal retort-house for this purpose, but on further consideration it was found to be unfeasible. The house covers a large area, and would have to be partitioned off with a number of 13½ in. brick walls to form buffers against blast and splinters. Large steam and water mains passed through the house, forming a potential danger, and very many openings would have to be bricked up. The hot coke conveyor system runs along the roof of the cellar, with 80 delivery chutes feeding into it, and it would be impossible to overcome this difficulty. We finally decided to build shelters away from all plant and buildings.

In the building of these shelters we utilized a large stock of good arched galvanized sheeting, which was obtained from a long "ropewalk" that had belonged to a now dismantled ropeworks adjoining the Grangetown Works.

This arched sheeting was further strengthened by bolting three sheets together before erection. A skeleton framework of the whole shelter was first made up of arched ¾ in. pipes, shaped to form an inner and outer arch with a 10-in. space between them made with distance pieces. The bottom of the pipe arches were fixed in a concrete floor at 3-ft. intervals, eventually forming the complete framework. The "three-ply" sheeting was then bolted to the inside and outside framework and the cavity so formed filled with concrete. This gave a 12-in. thickness of solid concrete arching further strengthened by the linings of sheeting. A 2 ft. 6 in. thickness of sandbags was built all over the shelter and the top covered with earth and turfed over. Accommodation for 30 to 40 men can be given in each shelter, which is provided with one main entrance and two emergency exits. The whole structure should be more than splinter-proof.

The shelters can be made gas-proof and the necessary ventilation is to be provided. For this purpose the installation of a complete poison gas filtration unit would be ideal, and allow men to remain in safety for long periods and also increase the capacity of the shelter. This type of special unit is costly, and considering that each man will be provided with a gas mask, and that it is most unlikely the shelters will be occupied for long periods, we do not propose to instal such plant.

We do not intend building these shelters any larger and are continuing to build others of the same size along the same site with a minimum distance of 30 ft. between them.

Although the shelters appear to be built on ground level, the site chosen has given the same effect as if the shelter had been sunk 6 ft. below the ground. A glance at the drawings will show that they are positioned in a valley formed by a high railway embankment on one side and high level ground on the other. (See fig. 2.)

Men will be able to reach cover here in less than four minutes from any part of the works. Each shelter will be in charge of a leader fully trained in A.R.P. who will give all orders and endeavour with others to prevent panic and give warning of the presence of gas. Each man will have a specified shelter with his number marked on the seat he will occupy.

Fire Precautions

War risks introduce new factors into fire prevention, and the arrangements for fire-fighting, which do not enter into the problem in peace time.

Emergency measures for reducing the fire risk were mainly a matter of intensifying the precautions which ought to be in force at all times. A separate store room is set aside, containing a good stock of supplementary supplies for all the various types of fire-fighting appliances and refills. These stores are not to be used except in case of a war emergency. In addition to the normal fire apparatus of the works, we have purchased two complete asbestos suits and shields, a useful provision in case of outbreak of fire in closed buildings, even

in peace time, where it would be necessary for a man to enter a burning building to shut off a valve in order to avert a major catastrophe. A 30-gallon continuous Foamite apparatus was also added for fighting oil and tar fires along with many non-continuous types.

Stirrup hand pumps, fitted with dual purpose nozzles for either a jet or water spray, and Redhill sand containers with scoops and rakes were provided, where necessary to deal with incendiary bombs. Stocks of dry sand were put aside.

In the event of our ordinary water supply not being available, we have two overhead tanks kept full from an artesian well. This water service is fitted at several points of the works with steam pumps for boosting the pressure. The storage of water at a height has many advantages for dealing with fires, but overhead tanks are liable to be vulnerable in case of air raids.

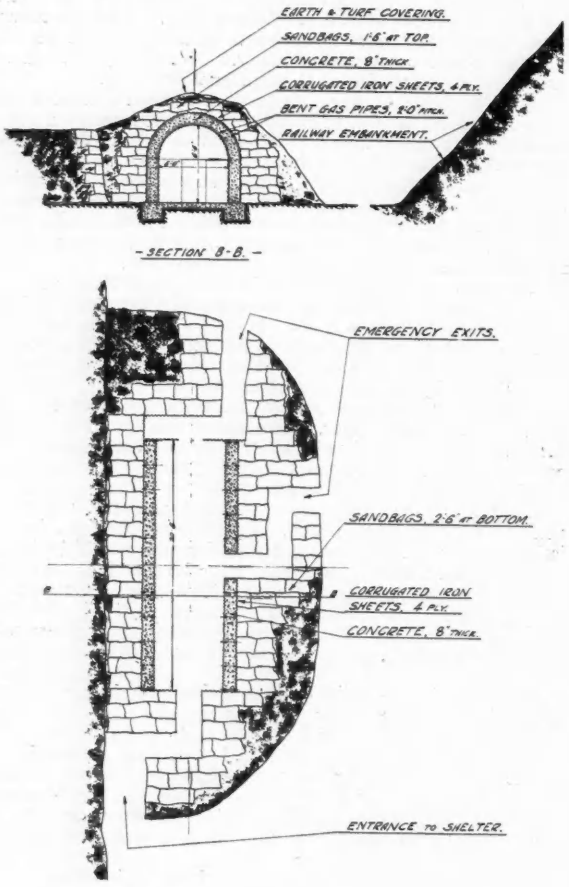


Fig. 2

Where wooden structures or partitions exist in such critical places as purifying houses, &c., these are being removed and replaced with brick as far as possible.

Fire Proofing.—Protection of timber from fire can be made by two methods:

Class I.—Treatment with an aqueous solution of inorganic salts of a certain type.

Class II.—Treatment with a paint forming a surface coating.

The action in the first case is chemical and in the second mechanical.

Class I.—Chemicals that can be used are many, some of which are mon-amm. phosphate, di-amm. phosphate, ammonium bromide, chloride and sulphate of ammonia, &c.

When subjected to heat, these chemicals react with the wood substance reducing the yield of inflammable gas and increasing the yield of water vapour and solid charcoal. The effect is to prevent flaming, and the residual charcoal, in addition, will not glow. Surface application of the solution (10 to 25% sol) by brushing or dipping, while affording a fair amount of protection against fire, results in insufficient penetration to give satisfactory protection. To obtain this protection impregnation would be necessary, either by means of pressure or by using an open hot tank. Unfortunately, amm. sulphate and other salts, being hygroscopic, tend to keep the timber damp and corrode metals, while amm: bromide would give off noxious fumes in case of fire.

The most satisfactory chemical is mon: amm: phosphate.

Class II.—Among the paints that could be used are those with a base of sodium and potassium silicate, with fillers and pigments—*e.g.*, china clay, whiting. A suitable cheap silicate paint consists of the following:

Sodium silicate (in form of syrup)	112 lb.
Kaolin (china clay)	150 lb.
Water	100 lb.

Costing about 1d. to 3d. per lb.

The object is to maintain a thick unbroken film, so insulating the wood from heat and from the oxygen supply. Where the appearance of the treated surface has to be considered, proprietary paints of the silicate type can be had in colours.

No external treatment with any type of paint will render wood incombustible, or protect the timber from the action of the bomb in actual contact with it. Consequently, treating the surface of a floor with any paint would be of little use.

For good effective fireproofing under Class 1 method, the timber should be impregnated under pressure, before erection, but liberal brush application of some of these solutions to timber *in situ* will probably give as much protection as most of the treatments under Class II. In a fire which has become well established, Class II paint coating will not afford the degree of protection as that given in Class I by impregnation; but paints, however, when thickly applied, will retard the spreading of local fires. In any case the use of timber should be deprecated for important structural members as these, being weakened by fire, might entail the collapse of the superstructure.

Gasholders

All the holders at the Cardiff Works are of the water-sealed type. We know there is no effective way of protecting gas holders from high explosives, but from the experience gained during the last war it is indicated that serious consequential damage is unlikely to arise from a hit on a water-sealed holder. I understand that the greater damage was caused to holders by fragments and splinters creating numerous perforations from bombs bursting a considerable distance away.

In addition to this, we may now have large numbers of fragments from anti-aircraft shells bursting at high altitudes to contend with.

It is pure conjecture as to what incendiary bombs will do, as we have no data on the matter. An incendiary bomb of the same weight as an high explosive bomb should do less damage. They have small powers of penetration as compared with high explosive, but sufficient to pierce a gas holder. It would take a mild steel plate, ¼ in. thick, to hold up a 2 lb. bomb. They contain within themselves the necessary elements of combustion and do not explode. If this fact may dare to be called an advantage, it would ignite the gas if the bomb was outside the holder, minimizing explosions, and should it pierce the holder crown or side, it should make one hole and plunge down into the water, be smothered and burn itself out under water.

A quick method of isolating a damaged holder is obviously necessary. At our works the isolating valves are adjacent to the holders with no secondary valves at a distance, so it would be almost impossible to approach the valves if a holder had been hit. The arrangement we have made is to connect up a water service pipe with a long distance control valve, so that the inlet and outlet of any holder could be flooded in a time of emergency. In the event of the normal supply of water for flooding failing, we can immediately turn over to a supply being pumped from an underground tank fed from the artesian well.

It has been decided to work in and out of one holder in war time, the remainder being completely shut off both at inlets and outlets. Should a hit be made on the working holder

we have a safety governor fitted allowing the holder to be by-passed so that the gas goes direct to district. Yet it may not be possible to work in this way, as the holder might be losing gas quicker than the rate of production, thus putting the safety governor out of action until the inlet and outlet of the holder had been closed or flooded.

It is very important that the men in charge of this section should be thoroughly trained in exactly what to do in case this section suffers a hit.

Camouflage

The purpose of camouflage is to make the bombing of special targets as difficult as possible. In the preparation of a scheme it is necessary to have an appreciation of colour values and drawing, with an experience of flying. Schemes should not be lightly undertaken without the advice of those experienced in this art.

To obtain accurate bombing of a target, it is necessary to recognize it at a distance of several miles away. If the target is not recognizable at this distance, the bomber will miss the target if he drops his bombs, due chiefly to the speed at which he is travelling; but he may turn back for another attempt, thus giving the local defence a better opportunity of dealing with him. If this is so, then camouflage has achieved some purpose.

It is impossible to camouflage a large installation to defy aerial photography, but it is important to realize that the observer in a bomber has to depend on his own vision when sighting bombs, although he may be well conversant with his target from air photographs, which is an entirely different matter.

Factories associated with a river or railway, which may act as a good guide, render the utility of camouflage doubtful; but anything done to make a target less conspicuous may be of critical importance, as we have to remember that raiders badly harassed on their way may find themselves approaching a target from a direction far different from that intended.

The size of camouflage pattern is important. To the normal vision under good conditions an object must be 6 ft. in its least dimension to be visible at five miles, and considerably larger to be noticeable. This is important to remember when deciding the size of pattern and also the comparative safety in ignoring the camouflage of small buildings.

We consider it impossible to achieve any complete success in the camouflage of gasholders. All we can attempt to do is to darken the light surfaces to conform with the prevailing tone of neighbourhood.

The points we are bearing in mind in any camouflaging we attempt are:

1. Don't use bright colours.
2. Don't use glossy paints.
3. Don't make patterns small.
4. Don't paint roofs the same tone as walls; roofs should be darker.
5. When matching colours remember that the colour on a small sample card will look lighter when applied to a large area.
6. If imitating grass on a roof, use matt surfaces.
7. Use fast colours.

The camouflage of large installations is a subject on its own, and, as I stated previously, it is a matter for the expert.

Steam-Raising Plant

Boilers are enclosed in buildings with walls of considerable thickness. One large battery has good protection from an enclosed coal storage and high railway embankment running along one side. In other positions barriers of sandbags or other forms of protection will be provided at vital points. The waste-heat boilers being in elevated positions cannot normally be protected. All boilers are equipped with automatic feed regulators, so that boilermen can safely take cover during the actual period of raid, knowing that, except for a hit, the boilers will remain in normal operation during the time they are away. It will be extremely difficult to give any protection to the length of overhead steam pipe we have on the works. The steam-raising plant is not centralized, but consists of four boiler houses at different parts of the works. Main steam lines are linked up in most cases, and with a good number of sectional isolating valves we hope to maintain a minimum supply.

Sulphuric Acid and Water Gas Oil Tanks

Acid tanks at the sulphate plant are 2 ft. above ground level, and walls of hard blue brick in cement have been built around these at a sufficient height to retain the acid in case of a break.

Our oil tanks are surrounded by a dry moat about 4 ft. deep. These moats are not deep enough to contain the contents of a full tank. The cost of providing underground accommodation for tanks is entirely prohibitive, so in our case we shall extend the moat walls with a surrounding bund high enough to hold the entire contents of the tank in the event of its being damaged. This will also afford protection against blast and splinters from bombs, dropping not less than 50 ft. away.

Automatic Blow-Offs

Hand-operated blow-offs were already installed on foul gas mains, but we have supplied blow-offs of the automatic type to each section of the carbonizing plant. They are of a type which can be set to any predetermined working point to release any excessive gas pressure to atmosphere in case of a stoppage. Water is the sealing medium used. In the event of a stoppage during an air raid and the water supply ceased due to damage, it would be difficult to provide a seal and start up again quickly, as for obvious reasons valves are not fitted between the foul main and the automatic blow-off. To overcome this we have fitted a quick operating butterfly valve in the blow-off stack to atmosphere. This could be quickly closed to resume normal operations and the seal made up in due course.

Station meters will be by-passed, inlet and outlet valves closed, and the meters should be purged with air. Valves and pipes of meters are to be well protected with sandbags.

Protection of Windows in Buildings Containing Vital Plant

Most of our buildings have walls with a minimum thickness of 14 in. which is thick enough to withstand splinters from bombs falling 50 ft. or more away, but this of course does not apply to windows.

It is well known that blast from the explosion of a high explosive bomb bursting some distance away from a window composed of the ordinary type of glass, may shatter the glass and project the broken pieces with considerable velocity into the building. This would be a considerable danger to people in the building if not to plant. The object of maintaining intact the glass, or a substitute for glass, in a window opening is, besides keeping out the effects of weather, &c., to prevent poison laden air entering the building.

At the expense of shutting out light and air, it is possible to protect glass by constructing on the outside a sandbag wall or earth traverse 2 ft. 6 in. thick entirely covering the window openings and touching the face of the wall with an overlap of at least 12 in. all round. Sandbags can be built up on staging, either resting on the ground or on supports built into and projecting out of the wall. If ventilation is essential then sandbags need not be carried to the top of the window but at the same time should not be lower than 6 ft. above the floor level inside the building. If this gap is left the window is, of course, not fully protected, and in a raid the upper half should be opened to prevent glass fragments falling into the room. This sandbagging, if of sufficient height, will protect the various plant, &c., from flying splinters.

Protection from blast cannot be given by fixing up steel or wooden shutters of practicable thickness on the outside of the window, owing to the fact that the "pressure pulse" or "section pulse" due to the blast is conveyed through such shutters to the air behind them, which, being under pressure or vacuum will shatter the glass. If protection on the lines given above cannot be given, the following recommendations illustrate various ways of obtaining a substantial degree of protection against blast.

(a) Resistance of 15-16 oz. glass to blast is increased by applying on the *inside* a film of tough material such as cellulose hydrate film and cellulose acetate film (used for wrapping purposes) or celluloid, using the correct adhesives for applying in each case.

(b) Replacement of glass with a vitreo-colloid material such as cellastoid, one-tenth of an inch thick, reinforced by ½ in

mesh wire netting fixed rigidly to the frame of the window and in contact with the sheets of vitreo-colloid.

(c) Glass reinforced with wire netting inside.
(d) Toughened or laminated glass.

At the Grangetown Works windows and doors that can be dispensed with are being bricked up. During war time all windows overlooking vital machinery will be bricked up and walls in similar positions will be sandbagged. We have also a good stock of plywood ready to fit in windows for obscuring light from those windows which are not overlooking important or vital plant.

Precautions on the District

The area of supply of the Cardiff Gas Light and Coke Company is over 70 sq. miles, the outside districts extending to over eight miles from the manufacturing station at Grangetown. We have some 375 miles of main pipes and 72,000 service pipes.

For the purpose of isolation in case of emergency, we have been able to prepare seventeen separate districts, which by the manipulation of valves already in existence, together with valves now being fixed, would enable us to cut off the supply of gas to any one of these areas. A record is kept of each tapping of our main pipes for bag holes, and these holes would be easily located and available for use in addition to the valves, for isolating.

For dealing with areas affected by aerial bombing, it has been arranged for a squad of men to be retained at each of our following stations:

Grangetown Works.
Bute Terrace Works.
Whitchurch Branch.
Penarth Branch.

In addition, two squads will be stationed at suitable points in the city. If necessary, it is possible for any squad to receive further help from the works.

These squads will be equipped to act independently, but arrangements are made for them to keep in touch with each other by messengers. Each squad will be supplied with a motor lorry containing full equipment, mains stoppers, tools, &c., and at each station respirators and full protective clothing will be stored.

All the squads will be fully trained in A.R.P. and in charge of a foreman conversant with the position of the mains, valves, and bag holes in his particular district. These squads will have to be maintained throughout the full period of a war.

In the case of a broken main the governor house at the works would reduce pressure on that particular district, in order to reduce the risks accompanying the loss of gas.

Other Precautions Taken

Air Raid Warning.—Several types of instruments were tested on the works, and it was soon obvious that a warning note of high frequency would be necessary to penetrate the general predominant low frequency noises given by the works. The ideal warning was found to be given by a rotary siren which has a large range from a low up to a very high frequency. This is now installed for air raid warnings only, and can be operated without delay from the works central control. It can be heard distinctly at any part of the works and over a very large area of Cardiff. The use of factory hooters for purposes other than air raid warnings is prohibited in war.

Lighting Restrictions.—Should war appear imminent, the lighting of the works will be at an absolute minimum, and those lights in use will be carefully shaded. All external lights will be extinguished permanently. A supply of dimmed and shaded hand lamps will be handed out to those who have to supervise various plant at intervals. On receipt of air raid warning, the whole of the works lighting will be immediately extinguished. Openings in boiler and retort houses, &c., are to be screened with some type of canvas shutters or curtain.

Marking of Valves.—All essential valves have been marked and their purpose indicated. Inlet valves are black, outlet valves white, and by-pass valves scarlet. Where the casing of the valve can be seen it is coloured as mentioned, but the valve wheels in this case are painted with luminous paint, which can be seen, if only dimly, at night.

Cleansing Centre.—A cleansing centre will be necessary to deal with cases of contamination by poison gas. Where practicable, the centre should be close to, or better still part of, the first-aid station, since contaminated persons may be suffering from injuries and require first-aid. It is our intention to adapt the building now utilized for bathrooms and mess room. This building is 150 yd. from the permanent works first-aid station, but it is quite large enough to incorporate a first-aid post.

Already this centre has good hot and cold water facilities, with baths, basins and showers. The walls and floors are entirely covered with glazed tiles, which is most desirable to prevent absorption of poison persistent gases. The shell of this building is 14 in. thick and the roof of the bathroom is of good thick reinforced concrete, arched between steel joists. Windows will be bricked up, and the correct sequence of undressing, cleansing and dressing rooms can be provided, along with a first-aid room, by partitioning off the large area at our disposal. Air locks for entrance and exit can easily be added. Fig. 3 illustrates the alterations that would be necessary.

We augmented our stocks of pipes, valves, &c., and obtained

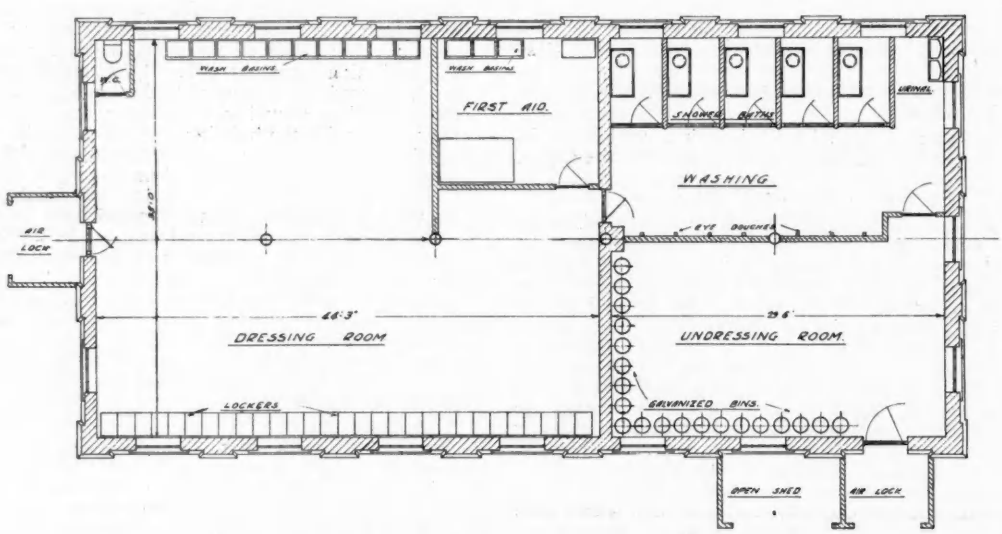


Fig. 3.—Layout of Cleansing Depot for A.R.P. Services

extra spares for machinery, while large stocks of sand and sandbags were put aside.

Respirators

None of the war gas respirators we have in stock afford protection against carbon monoxide, so respirators of the general service type were obtained, which are suitable for an atmosphere of carbon monoxide and war gases where there is sufficient air to support breathing. These respirators are quite efficient under the conditions mentioned, but cannot be used in enclosed places, or in any circumstances where a high concentration of coal gas is likely to be present, or where the atmosphere is deficient in oxygen. To meet these extreme conditions self-contained breathing apparatus, working on the regenerative system, using oxygen and carbon dioxide absorbent, were obtained.

There is now on the market a respirator specially designed for gas undertakings. This apparatus is quite simple and comprises a respirator of the general service pattern. At the bottom of the container is a connexion, to which can be attached a length of flexible armoured hose, the free end of which is secured in fresh air "up wind" from any source of gas. The respirator is used normally for protection against all war gases. In an emergency, where coal gas also exists, the length of hose is quickly attached, the free end carried away to a suitable place so that the wearer draws air from a distance, uncontaminated by coal gas.

To our normal works first-aid equipment we added additional oxygen and carbon dioxide resuscitating apparatus for casualties resulting from fumes or war gases.

Arrangements for Air Raid Warnings

Arrangements have been made to man the telephone continuously throughout the 24 hours, for the receiving and transmitting of messages. Operators are trained in the code messages to be used and the action to be taken. Time and efficiency tests are regularly being made in conjunction with the local authorities and found satisfactory.

Four messages are used and passed on by means of a code of colours as below. This code must be memorized by all concerned.

Description of Message.	Text of Message as Passed by Telephone.
No. 1. Air Raid Message—Yellow.	Preliminary condition—stand by.
No. 2. Air Raid Warning—Red.	Immediate action.
No. 3. Air Raid Message—Green.	Revert to stand by.
No. 4. Air Raid Message—White.	All clear—revert to normal condition.

On receipt of message No. 1—Yellow, the operator will immediately inform the responsible official in charge, and *only* him. This must be quite definite, and the message treated as confidential, as frequently it will prove to be an unnecessary alarm, and will often not even be followed by the "Action Warning." The official on receiving this message must see that the Works is in a condition to act, without delay, on the No. 2 Warning—Red. He may, so far as he thinks necessary, call on vital services to stand by, but on no account call public attention to his actions.

On receipt of No. 2 Warning—Red, the operator will immediately notify our works central control which can sound the air raid warning in less than five seconds and then transmit this message and any others to our Bute Terrace station by private line. The same action applies to No. 3 Message—Green, except that a different signal will be sounded on the works siren.

Upon receipt of No. 4 Message—White, this is treated as confidential, cancelling message Yellow, and transmitted only to the official in charge of the works who will see that work is resumed as quickly as possible.

It may be of interest to you to know of the instructions that have been issued to the various sections of our works. Possibly you may think of other points that are not included. Provided you have the right type of men selected for emergency duties, I think most of the schemes revert to 80% common sense and the remainder good practice and training.

Most sectional instructions are bound to be fairly common to gas-works practice, and I am including ours below hoping they may be of some guide or assistance to you.

Detailed instructions are printed for each man who has specialized duties, also for workmen explaining what arrangements they must carry out for their own safety during air raids. The instructions are given as follows:

General Instructions to Staff

Official in Charge of the Works

1. At all times maintain contact with the telephone operator and see that the Works Central Control is always ready to broadcast the various warnings. When receiving Message—Yellow, you must see that the works is in a condition to respond immediately to the further warnings. On no account call public attention to Message—Yellow. But if you think necessary call on vital services to stand by only.
2. On receipt of Action Warning—Red, verify that all key men have taken action.
3. Make certain all lighting is extinguished.
4. See that work is resumed quickly when the all clear is given.

Key Men

On receipt of "Action Warning" proceed at once to your duty stations.

Governor House

On receipt of Action Warning:

1. Extinguish lights as arranged.
2. Immediately reduce pressure at outlet of governors to 3 in.
3. Shut down boosters and compressors.
4. Keep in touch with the responsible officer and Works Central Control.
5. Be fully prepared to carry out emergency steps in which you have been instructed in case of damage.

Exhauster Drivers

On receiving Action Warning:

1. Extinguish lights as arranged.
2. Fracture of any exhauster main would probably cause the exhauster to speed up excessively. Your gauges will indicate what has happened. The exhauster should be closed down and the official in charge notified immediately.
3. Damaged plant to be by-passed.
4. Keep in touch with the official in charge who will instruct you when to start up after a shut down.

Boiler Men

On receiving Action Warning:

1. Extinguish all lights.
2. Close furnace doors to prevent glare.
3. Do not ash out and extinguish hot ashes.
4. Shut steam of blowers.
5. See that the boiler water level has been maintained and retire to allotted shelter.
6. You have been instructed as to what steps to take in case of burst mains.

Vertical Retort House Foremen

On receipt of Action Warning:

1. Extinguish all lights.
2. Close all doors and retorts and prevent any glare.
3. Damage internally to retort house must be isolated as soon as possible; if this is impossible the house must be closed down and gas blown off through the automatic and hand-operated blow offs, after notifying the responsible official.
4. Should excessive pressure conditions prevail through some external trouble to the house, the automatic blow-offs will come into action. Then extractors must be stopped, steam shut off, retorts and waste heat-boilers by-passed.
5. If excessive pull conditions prevail, shut main outlet valves and isolate the house, blowing gas to atmosphere.
6. Should it be apparent that the "shut down" will last some time reduce main chimney dampers to give a minimum pull to prevent over-heating in retorts and settings.

Vertical Plant Waste-Heat Boiler Men

1. If the foreman informs you he is shutting down the house, by-pass and shut down waste-heat boilers.
2. Keep close watch on the water supply; if any lack of pressure by-pass and shut down boilers immediately.
3. Test regularly automatic water feed system in conjunction with the high and low water level warning.

Horizontal Retort House Foremen

On receipt of Action Warning:
1. Extinguish lights as arranged.
2. Stop draw; all retort and producer doors to be closed to prevent glare.
3. Any damage to retort house internally to be isolated as soon as possible. If this cannot be done the house must be closed down and gas blown off after notifying the responsible official.
4. If excessive pressure prevails, blow-off will come into action, or if excessive pull resulting from external damage occurs, shut gas valves isolating retort house, and blow gas to atmosphere.

Water Gas Plant Operators

On receipt of Action Warning:
1. Extinguish lights as arranged.
2. Shut down plant in the usual manner.
3. See that waste-heat boiler water is at full level.
4. Close condenser valves.

Water Gas Plant Exhauster Driver

On receipt of Action Warning:
1. Extinguish lights as arranged.
2. Stop exhauster.
3. Close all valves.

Works Central Control

The telephone to be manned throughout the whole 24 hours, and on no account must it be left unattended.

On receipt of Action Warning:
1. Sound works siren as instructed.
2. Extinguish lights as arranged.
3. Stand by to carry out further warnings as laid down by the air raid code with which you are supplied.
4. Quick action is expected from you as the whole works depends on you to give the warnings.

Telephone Operators

1. The telephone is to be manned throughout the whole 24 hours, and on no account is it to be left unattended.
2. Be thoroughly conversant with the air raid code with which you have been supplied and transmit communications with all possible speed.
3. It is most essential that you keep in touch with the official in charge.

Power House Attendants

On receipt of Action Warning:
1. Extinguish lighting as you have been instructed.
2. Keep in touch with the responsible official or messengers in case of shutting down of certain sections of the works.

Gatekeepers

On receipt of Action Warning:
1. Extinguish all lights in your area.
2. Close gates.
3. Allow men who have no duty on works to leave.
4. Keep in touch with telephone operator and give what assistance possible.

Locomotive and Crane Drivers

On receipt of Action Warning:
1. Stop at convenient position.
2. Extinguish lights or glare.
3. Retire to nearest shelter.

General Instructions to Men not Allotted Special Duties

1. Your gas mask, which you must bring to the works each day, must be placed in your shelter on the seat numbered and allotted to you. On the conclusion of your work you must collect your mask.
2. When the action warning is sounded, proceed immediately to your respective shelters in an orderly fashion, where you will be under the control of the A.R.P. leader in charge.
3. Avoid panic and give every assistance to maintain the morale of your colleagues.

All undertakings are engaged in preparation of schemes for minimizing the effects of air attacks. Public services which are being organized by local authorities for this purpose are available for everybody. But these arrangements, however effective they may be, will need to be supplemented by the individual efforts of employers and employees.

It is of great importance that all gas undertakings should work in close co-operation with their local authority. Not only will companies be dependent on local authorities for hospital and other arrangements, but in certain circumstances where the company has not suffered, they might be in a position to give assistance to local authorities in case of need.

The importance of doing all that is possible to protect the lives of employees and the safeguarding of plant does not need to be stressed, and any measures which can be taken to enable the continuous production of gas—especially for vital national and commercial services—to be maintained will be of the greatest value to our country.

Southport Gas Department

Resolutions at Town Council Meeting

Several items relating to the Gas Estate were submitted at the meeting of the Southport Town Council on Tuesday (Oct. 3). The Finance Committee reported receipt of letters from Messrs. J. H. Clegg and W. E. Plevin, respectively, asking for the return of their superannuation contributions. The Committee resolved that sums equal to the whole of the aggregate amounts of the contributions of Messrs. Clegg and Plevin, respectively, to the superannuation fund be returned to them.

The Gas Committee reported receipt of a letter from the Secretary of the Gas Light and Coke Company, stating that the Company are very short of engineering staff and are unable to spare the services of Mr. A. E. Sumner (Acting Deputy Gas Engineer) for any extended period. It was resolved that applications be invited from persons not exceeding 40 years of age, for the position of Deputy Gas Engineer, at a salary of £500 per annum and that the Committee be authorized to make an appointment and that the functions exercisable by the Council in this matter be delegated to this Committee.

The Gas Committee also reported that the Ministry of Health had sanctioned a loan of £29,000 for the provision of a new gasholder at the Crowlands Gas-Works. The Committee also reported receipt of a letter from the Federation of Gas Employees with reference to the rates of pay for men "standing by" for civil defence emergency work. It was resolved that in accordance with the recommendation of the Federation the men in the Gas Department so employed be paid the normal weekly rate, plus 5s., for seven shifts of eight hours during each week.

Price Increases

As a result of the national emergency and for other reasons, chiefly related to increased coal costs, the undernoted advances in the price of gas are announced:

Bangor (Co. Down).—By 1d. per 1,000 cu.ft.

Clitheroe.—By 5d. per 1,000 cu.ft. Explaining this increase to the Town Council, Alderman Manley stated that the Department last year suffered a loss of £400 in consequence of increased coal charges. This burden would continue, and there might be additional expenditure as the result of coal having to be transferred from more distant collieries.

Dumbarton.—By 6d. per 1,000 cu.ft.—necessitated in part by the lighting restrictions.

Elgin.—By 6d. per 1,000 cu.ft.—agreed by Town Council on September 25.

Halifax.—By 10% as from the first meter reading in the December quarter. The same increase will apply to prepayment meters as from the date of alteration of meter mechanisms, while negotiations with a view to revision of special agreements with various industrial gas consumers will be opened.

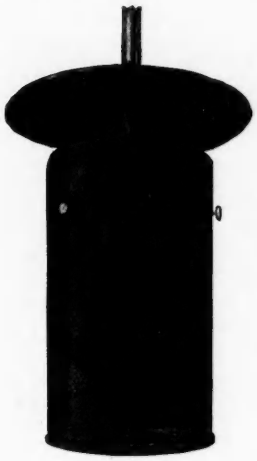
Londonderry.—As and from Oct. 1 gas in Londonderry City has been advanced 1d. per therm, or approximately 5d. per 1,000 cu.ft.

Oswaldtwistle.—Owing to a loss of £1,300 on the Gas Undertaking, it will be necessary to revise gas charges to a figure which will still make them compare very favourably with those of many other undertakings in Lancashire.

Trade News

A.R.P. Requisites for Gas Lighting

Many weird and wonderful contraptions have made their appearance during the last few weeks in an effort to screen our lighting. Thick paper, black paint, indeed anything which by any stretch of imagination can be calculated to divert light away from those chinks in the curtains which even the best blackout arrangements cannot always avoid, have been variously applied to the light in a manner not infrequently suggestive of Mr. Heath Robinson's master hand. Manufacturers, however, have not been slow to respond to this new demand for effective means of screening lights; but gas lighting presents a special problem. One cannot, for instance, blithely drape black crepe or paper around the gas bracket—not, that is, unless one is desirous of providing an early test of the efficiency of the local A.F.S. or has a grudge against one's insurance company. For this reason it is gratifying to note the steps being taken by manufacturers of gas lighting fittings to provide means of making the blackout more effective and yet maintain a comfortable light for all normal purposes. Such a device is that just perfected by Messrs. Falk, Stadelmann & Co., Ltd., of Farringdon Road, E.C. 1. As will be seen from the accompanying illustration, it consists of a cylindrical screen with perforated base-plate, which directs the light to the floor. Above this screen is a circular metal disc which prevents upward glare. The device is available for both Universal and Bijou fittings and sells at a price well within the reach of the average gas consumer. Attachment is simplicity itself; all that is necessary is to place the metal disc between the burner and the fitting; remove the gallery screws and slip the cylinder upwards into position. The cylinder is then secured by replacing the gallery screws through the three holes provided.



Hot and Boiling Water for A.R.P. Stations

In practically all branches of A.R.P. work the time factor is of first importance, but in none is this so apparent as in the need for instantaneous hot and boiling water for dressing stations. For rapid sterilizing of surgical instruments there is a call for water at boiling-point, and it is essential that a means be available for supplying this continuously if necessary, and by a means that positively ensures that the full boiling temperature will be maintained without supervision.

The Radiation 80-SB gas water heater is stated completely to satisfy these requirements, as it delivers either hot or boiling water instantly and requires no attention. Economy is assured by the automatic control, which cuts down the gas when water is not being drawn.

For decontamination and cleansing, the larger Radiation water heater (No. 210-M) instantly gives an ample supply of hot water—sufficient for two or three shower baths. The governor device ensures an unvarying temperature of the water, which is maintained exactly at the degree to which the temperature adjustor is set. The supply of boiling water for the decontamination of clothes could in emergency be speeded up considerably by this heater.

The installation of such gas water heaters removes all the worry attaching to the hot water requirements of A.R.P. stations. Installation is without difficulties, and advice will gladly be given by Radiation, Ltd. (Publications Dept.), 8, Sheet Street, Windsor.

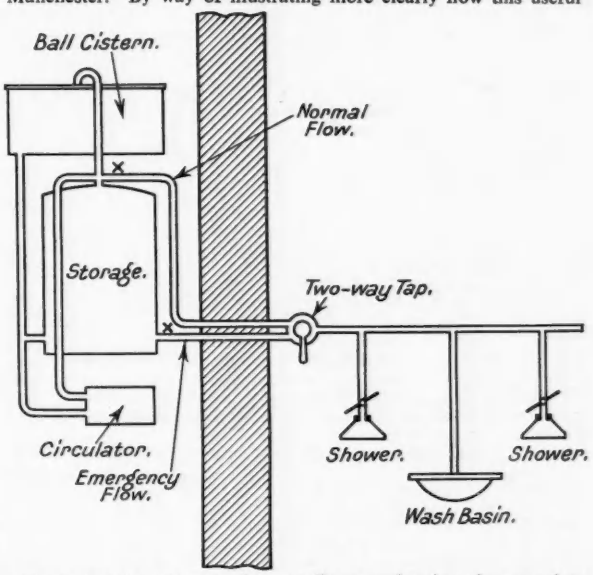
Mechanical Time Lags

In a variety of industrial applications which call for a delayed action or where the time for a process is critical, mechanical time lags provide a precise means of control. Such mechanisms are described and illustrated in a leaflet recently issued by Rotherham & Sons, Ltd., of Coventry. The firm's technical specialists have developed a series of time lags for a wide field of uses—such as electrical switchgear and starter motor controls applied, for example, to derricks, hoists, lifts, &c., in starting gear of coal and coke handling plants and telphers, in circuit-breakers, automatic stokers, and many other applications—in all of which accuracy and reliability are the keynote.

These instruments are specially designed to give a consistent delay and can be relied upon to do so. They are of robust construction, and among those illustrated in the leaflet is a neat and compact little mechanism, escapement controlled, with a stroke of approximately ¼ in. It is made in four timings—nominally 2, 5, 15, and 40 seconds, these times being obtained with a load of about 40 oz. They work satisfactorily, it is stated, with loads down to 6 oz. and the delay is correspondingly longer. The firm's Technical Department is always ready to investigate any problem in strict confidence and make recommendations. They have had extensive experience of adapting their instruments for all types of special applications, while their specialized manufacturing services are also available for making instruments or parts to customer's own specification if in quantity.

Water Heating for A.R.P.

We referred in these columns last week to an interesting unit for A.R.P. hot water supplies evolved by Maxol Heaters, Ltd., of Manchester. By way of illustrating more clearly how this useful



system operates we reproduce a diagram showing the complete layout. Reference to this will readily indicate the additional emergency draw-off connexion at the base of the storage tank, thus ensuring that the full amount of hot water is available, even though the gas and water supplies may have become interrupted. Adequate hot water for the showers, &c., necessary for decontamination squads is thus ensured at critical times between the fracturing of mains or services and the execution of repairs.

Aerolete Gas Flue Terminals

During the last few years the Aerolete Ventilating Co. have made important improvements in connexion with the evacuation of the products of combustion and prevention of down-draught or back blow. Under their patent two systems are employed. The first deals with vertical flues of all kinds and consists of a

"Aerolete" Wall Terminal

The "Aerolete" vertical flue terminal

terminal having a superimposed series of louvres in which the lowest ring is of low pitch and each ascending ring has the pitch increased, the object being that air currents striking the appliance are diverted internally upwards at an increasing velocity towards the top. This sets up a partial vacuum, and the products of combustion are drawn upwards. At the top, a double lip is

formed by a return curve of the topmost louvre and a cap; air currents acting on this lip set up a further extracting action, with the result that a very high efficiency is attained and down-blow eliminated. These vertical type terminals are manufactured in asbestos cement and have standard sockets for all pipe sizes from 2 in. upwards. They have proved of great value in restoring the pull lost by long awkward runs of the flue, and have recently been used where evacuation of 7 million cu.ft. per hour was called for and have stood up to these huge quantities with complete success.

The second type—known as "Aerolete" wall terminals—is for use where the flue terminates horizontally through vertical surfaces and where it is inconvenient to take a vertical pipe up the face of the building. These positions are difficult, as air currents blowing directly on to such surfaces set up a region of high pressure on the wall face. The "Aerolete" terminal is designed to utilize these air currents in assisting evacuation. In the illustrations, it will be seen that the outlet is not on the wall surface and is outside the area of air pocketing set up by pipes up to 6 in. diameter. A unique feature of this terminal is the formation of two lips. The one nearest the wall utilizes the eddy set up and controlled by the curve adjacent to the wall, while the other is formed by the cap. The result is that a strong suction is formed and the products of combustion are drawn out. This takes place no matter what the angle is of the wind. As the result of the streamlined interior, the outflow of gases takes a natural form which decreases the outlet resistance to a minimum. These are also manufactured in asbestos cement to standard sizes from 3 in. upwards, but can also be supplied in metal.

It is understood that more than a hundred gas undertakings are now using and supplying "Aerolete" terminals, while they are also rapidly coming into popular use generally throughout the building trade. Messrs. Cookers & Geysers, Ltd., of 55-56, High Holborn, W.C.1, are the sole distributors of "Aerolete" terminals for the Gas Industry in the United Kingdom.

Emergency Connexions to Broken Mains

In the event of mains being broken by high explosive bombs the problem of how to provide a temporary supply would become of immediate importance. The Lead Wool Co., Ltd., of Snodland, Kent, have devised a pipe connexion to provide for quickly connecting the two broken spigot ends of pipes. A rubber ring with lead tip is held under compression to make a tight joint at one end, the connexion being held on the pipe by means of cup-headed set screws. At the opposite end the connexion is threaded for wrought-iron pipe to which a flexible tube or a fire hose connexion could be made. With one of these connexions fitted on each broken end, an emergency supply could be provided until a permanent repair is effected. A very important point to consider is the time factor. This connexion can be fitted in a few minutes, as the pipes would not have to be cut—only broken off reasonably square—and only a spanner is needed.

Gas Undertakings Results

Bradford

The total sales of gas by the City of Bradford Gas Department during the financial year to March 31 last amounted to 1,897,771,000 cu.ft., which compares with 1,933,779,000 cu.ft. for the preceding year—a decrease of 36,008,000 cu.ft., or 1.86%. The total number of meters at March last was 95,134, or 161 per mile of main; in 1938 the figures were 95,517 and 163 respectively. The past year's working resulted in a gross profit of £34,630, but after providing for interest charges and contributions to sinking fund the net result is a loss of £4,501, as against a profit of £7,183 earned during the previous twelve months. The outstanding capital debt has been reduced in the last fifteen years by £61,455, notwithstanding the reconstruction of the manufacturing plant and its centralization, first, at three works and more recently at one, and also extensions to mains. Over the past twelve months the average price realized for gas shows a slight reduction, from 2s. 9.79d. to 2s. 9.53d. per 1,000 cu.ft., due to increased consumption at the two-part rate of charge. The City Council have approved a recommendation of the Gas Committee that charges be increased by 5% on the flat rate and 10% on the domestic two-part rate, and that industrial consumers on the two-part rate be subject to an increase or decrease with the rise and fall in the price of coal. The price received per ton of tar has been the lowest since 1932, but it is stated that the returns for the Co-operative Tar Scheme for the Yorkshire district compare very favourably with other areas, and the arrangement is working satisfactorily. Recently made contracts show an increase of 25% on 1935 prices.

Burnley

The total quantity of gas sold by the County Borough of Burnley Gas Department during the twelve months to March last was 927,879,495 cu.ft., which compares with 958,244,914 cu.ft. in the preceding financial year. The same quantity of coke-oven gas (541,500,000 cu.ft.) was purchased, but the total gas sent out was 993,891,000 cu.ft., against 1,036,830,000 cu.ft., a decrease of 42,939,000 cu.ft., or 4.14%. Gas used in public lamps, which last year showed a big rise, is up again—this time by over 2,000,000 cu.ft. Of the gas sold by meter, 24.1% (against 23.7%) was for motive power, industrial purposes, and central heating. Nearly one-half of the total sales were to prepayment consumers. During the past ten years the quantity of gas used for industrial purposes has increased from 43 to 196 million cu.ft.; while that consumed through ordinary and prepayment meters for domestic purposes shows a loss of 194,000,000 cu.ft. The figures for the past year show a decrease in the gas used for domestic purposes of over 27,000,000 cu.ft., prepayment consumers being responsible for a falling-off of 17,000,000. The cost of coal shows an increase of 4s. 4½d. per ton, or 24½%, since the introduction of the various District Coal Selling Schemes, while the prices for the coming year show still further increases. The benzole plant continued to be of great assistance financially to the Department; but the value of tar and tar products fell during the year to one of the lowest figures on record in recent years. The supply of coke-oven gas has been satisfactory, and a new agreement has been entered into with the Lancashire Foundry Coke Company for a continuance of the supply of gas for a further period of ten years. The number of meters in use at March last was 32,779, of which 23,760 were of the prepayment type. The total shows a decrease of 80 on that of the previous year. To aid in maintaining the continuity of the gas supply in all circumstances, the Department has linked-up to the distribution system of the Nelson Gas Undertaking. With an unchanged scale of charges, the year's operations have resulted in a net deficit of £4,817, as compared with a net profit of £4,333 a year ago.

Coatbridge

The amount received by the Coatbridge Gas Company for sales of gas during the twelve months ended June 30 last was £55,624, which compares with the sum of £54,256 in the preceding year. The total receipts on Revenue Account are £75,131, and the balance carried to Profit and Loss Account £13,544; the figures for last year being £76,726 and £14,998 respectively. The quantity of gas sold was 1,642,828 therms, as against 1,513,530 therms in the year to June, 1938. Cost of coal is about £4,000 up on the present occasion, while residual products have realized more than £2,000 less. Again, this year profit on sales at showroom appears at £298; whereas last year on the receipts side of the Revenue Account sales at showroom figured at £1,093, and, on the other side of the account, apparatus purchased at £815. The final dividends are again at the rate of £9 5s.% actual on the original stock and £6 9s. 6d.% actual on the four issues of £10 shares.

Colonial Gas Association

The quantity of gas sold by the Colonial Gas Association, Ltd., during the twelve months ended June 30 shows an increase of 4.84% over the sales of the preceding year. The increase in sales of gas for the subsidiary undertakings is 4.93%. The net profit for the year is £85,590, and adding the amount brought forward the sum available is £110,804. At the fifty-first annual general meeting, to be held in Melbourne, the Directors are recommending the payment of dividends for the year of 8%, Australian currency, on the preference shares and of 6%, Australian currency, on the ordinary shares. After payment of these, and the transfer of the sum of £7,500 to the credit of the Reserve Fund, there will remain a balance of approximately £25,454 to be carried forward to the next account. In connexion with debentures due to mature in November and January next, an offer was made to extend the currency to 1954, with interest at the rate of 4¼% per annum. The result will be an annual saving to the Association of about £2,000. Further similar debentures have been issued the proceeds of which will be utilized to reduce the overdraft and for providing extensions required on the works and mains.

Chesterfield

The year to March last was an extremely good one, as regards working results, for the Borough of Chesterfield Gas Undertaking—gas sales exhibiting the substantial increase of 14.46% over those of the preceding year. This trend has been continuous since 1934, from which time the sales of gas have more than doubled. During the past twelve months the heavy industrial load has increased by 27.16%, and in almost every other direction gains have been experienced. An exception is a slight falling-off in the consumption through prepayment meters, attributable to the severe competition for this business. The total

gas sold (including that used on works, &c.) was 793,117,000 cu.ft., which compares with 694,150,000 cu.ft. in the previous year. A largely increased quantity of coke-oven gas was taken during the past twelve months, as required by the agreements—the actual amount being 609,137,000 cu.ft. against 441,204,000 cu.ft. in the year to March, 1938. The total number of consumers continues to increase, a gain of close upon 500 having been registered during the past twelve months, to 19,951. It is the same with the public lamps, which have increased in number by just over 100 in the period under review. The net profit on the year's working is £1,157, as compared with £4.045 for the year before. A new 18-in. station governor has been fixed in place of one which had been in continuous use for 63 years.

Darlington

In the "JOURNAL" of Aug. 16 (see p. 390), reference was made to the benefits which had accrued to the consumers through the taking of coke-oven gas by the County Borough of Darlington gas undertaking. It was shown that the sum of £25,180 represents the saving in one year to the consumers, consequent upon the supply of this gas. Of this big total, £13,560 represents the saving due to the reduced prices it has been possible to charge by taking coke-oven gas, and £11,620 is the sum by which it would have been necessary to increase the price of gas, had it been made in their own works, to meet the extra cost of coal. The gas-works accounts and statistics for the year to March 31 last show that the quantity of gas sold was 3,399,819 therms, which compares with 3,180,256 therms in the preceding year. Increases are recorded for each class of consumer, except power, under which head there has been a trifling decrease. In cubic feet, the sales total 682,837,000 cu.ft., as against 651,310,000 cu.ft. for the year to March, 1938. A net profit of £1,329 compares with one of £996 a year ago. During the past financial year, for the first time, no coal was carbonized at the gas-works. Of the total of 25,038 consumers, 14,788 take gas through prepayment meters. The number of public lamps increased during the year from 2,314 to 2,340.

Dublin

The accounts of the Alliance and Dublin Consumers' Gas Company for the half-year to June 30 last show a profit on Revenue Account of £74,623, as compared with £68,075 for the corresponding six months of the previous year. With the balance brought into account, there is a total available of £83,212, as against £88,343 a year ago. After the payment of a dividend on the consolidated ordinary stock at the rate of 8% per annum, a balance of £12,514 will remain to be carried to the next account. A year ago the dividend was at the same rate, and the carry forward was £17,637. The quantity of gas sold in the past six months was 7,238,295 therms, which compares with 7,056,237 therms in the June half of 1938. The balance of revenue carried to Profit and Loss Account on the present occasion is £74,623; for the corresponding six months of last year it was £68,075. Revenue receipts are up about £2,000, while the expenditure is down nearly £5,000. Distribution costs are £13,000 down.

Dunfermline

The income of the Dunfermline Corporation Gas-Works for the year ended May 15 amounted to £84,908, and the expenditure to £68,074, leaving a gross profit of £16,834. There is a net deficit for the year of £146. The quantity of gas made was 444,208,000 cu.ft., an increase of 9,201,000 cu.ft., equal to 2.11%; and the quantity accounted for increased by 16,006,920 cu.ft., equal to 4.05%. The net income from residual products amounted to £16,959. In 1938 the income from residuals was £18,261.

Taunton

Continued expansion and progress is reported by the Taunton and District Gas Company, as well as by its subsidiary, the Langport Huish and Curry Rivel Gas Co., Ltd. The Directors recommended at the annual meeting the payment of the following dividends in respect of the year ended June 30: On the various preference stocks at the full rates; on the consolidated "A" stock at the rate of 9% per annum; and on the remaining ordinary shares and new ordinary stock at the rate of 7⅛% per annum. This would leave a sum of £3,609 to be carried forward. On Aug. 31, 1938, Mr. Clarence Harris retired from the position of Engineer and General Manager. In order that the Company should continue to have the benefit of his long experience, he has been appointed to the office of Managing Director. During the year several large extensions of mains have been made, and over 80% of the houses covered by these mains have taken a supply of gas. The Company are now supplying gas 15 miles from their Taunton works.

Gas-Fired Hot Water Supply and Heating Equipment

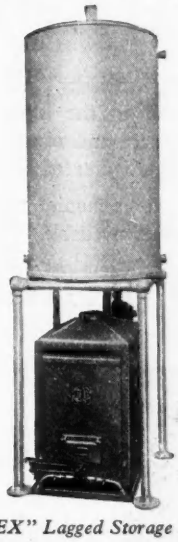
The output of our Factory in Gas Boiler manufacture and the energies of our personnel are devoted to Government requirements for Equipment of Hot Water Supplies, Central Heating, etc., to meet the present crisis, but our valued customers of pre-war days can be assured of receiving the maximum services we have at our disposal and orders of a private nature will have prompt attention.

A.R.P.

"EMPIRE" "EMPEROR,"

"REX"

Gas-Fired Boilers and complete storage sets are available for all forms of decontamination and meet the full requirements of the Home Office for Buildings of every size.



"REX" Lagged Storage Set.

WAR ESTABLISHMENTS

HOT WATER SUPPLY
CENTRAL HEATING

The design of Potterton Gas-Fired Boilers and controls fully meet the standard specification of War Office, Admiralty and Air Ministry for Camps, Militia Huts, Canteens, Hospitals etc.

THOMAS POTTERTON (Heating Engineers) Ltd.

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"Designs of simple and refined appearance"

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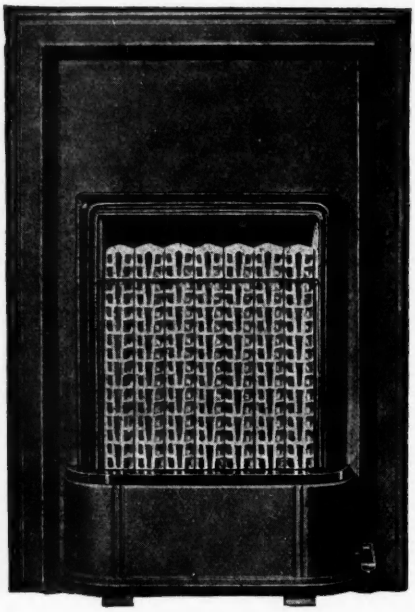
FIRE KING



6, 7 and 9 Radiant sizes available

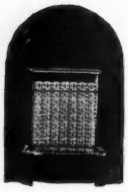
MAIN

Fire King
SERIES OF GAS FIRES

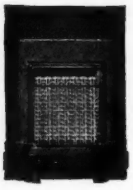
Radiant efficiency; hygienic efficiency; and mechanical and maintenance details have been perfected to the highest degree in the Fire King series, which consist of square and round top designs of great dignity. A simple and effective Self-Lighter of improved pattern is incorporated.

Each Fire in the series will harmonise with any modern interior, owing to the wide range of finishes available.

R. & A. MAIN LTD., LONDON & FALKIRK



No. 1437 FIRE QUEEN



No. 1447 FIRE CHIEF

No. 1457 FIRE PRINCE

No. 1557 FIRE PRINCESS

Markets and Manufactures

Current Sales of Gas Products

The London Market

Oct. 2.

The chief point of interest in the tar products market is that licences are no longer required for:

Pitch for export, and to-day's price is about 30s. per ton f.o.b.

Creosote is about 5d. per gallon.

Refined tar 3¾d. to 4d.

Pure Toluole is nominal at 2s. 6d. to 2s. 7d.

Pure Benzole about 1s. 9d.

All per gallon naked at makers' works.

The Provinces

Oct. 2.

Crude Gas-Works Tar, 10s. to 15s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 25s. to 27s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 25s. to 27s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4¼d. to 1s. 5d. Heavy naphtha, North, 1s. 2¼d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3⅞d. to 4¼d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal, "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1,080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, Sept. 30.

Plentiful supplies of all products are available, although there is a continued reluctance on the part of producers to commit themselves to any great extent.

Crude gas-works tar.—The actual value can to-day be called 28s. to 30s. per ton, *ex* works in bulk, but this is nominal.

Pitch of vertical quality is quoted at 24s. to 25s. per ton, f.o.b. for export, and round 20s. to 22s. 6d. per ton *ex* works in bulk for home trade.

Refined tar is available in the home market at 3¾d. to 4d. per gallon, and for export at 2¾d. to 3d. per gallon, into buyers' packages at makers' works.

Creosote oil.—With most buyers covered on contract there is little business taking place and prices are approximately as follows: Specification oil, 4d. to 4¼d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 4d. to 4¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—A limited amount of business is taking place at the following prices: Pale, 97/99%, 1s. 9d. to 2s. per gallon; Dark, 97/99%, 1s. 6d. to 1s. 9d. per gallon; Pale, 99/100%, 2s. to 2s. 3d. per gallon; all *ex* works in buyers' packages.

Crude naphtha remains unchanged at 5d. to 5½d. per gallon, *ex* works in bulk, according to quality.

Solvent naphtha is valued at 1s. 4d. to 1s. 5d. per gallon for 90/160 grade and 1s. 1¼d. to 1s. 2d. per gallon for 90/190 heavy naphtha.

Motor Benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—Prices are nominal at 12s. to 13s. per gallon for 90/160 grade and 14s. to 15s. per gallon for 90/140 grade.

Dividends Announced

Vickers, Ltd.—With reference to the previous announcement of an interim dividend of 4% (actual) in respect of the year 1939 on the ordinary stock of Vickers, Ltd., payable on Oct. 26, 1939, the Directors of the Company give notice that income tax will be deducted at the rate of 7s. in the £1.

Contract Advertised

Benzole Plant.
Keighley Gas Department. [p. 46.]

B.S/A.R.P.2
BITUMINOUS PAINT FOR STEELWORK

METROTECT

a bituminous paint conforming to the above specification, and producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously immersed in water. Does not "crocodile" on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

ALSO AN EXCELLENT BLACK-OUT PAINT FOR WINDOWS AND SKY-LIGHTS.

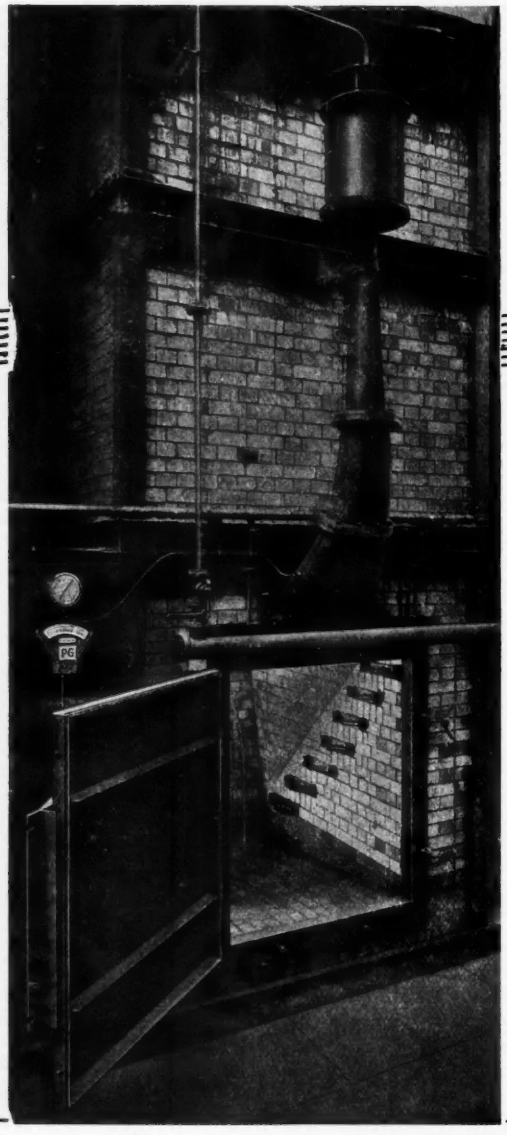
Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

Telephone: AVENUE 2755.

MODERN DESIGN—



MODERN

EQUIPMENT

Pressure producer equipment installed with Glover-West vertical retorts for the Leeds Corporation Gas Department (Meadow Lane Works)

West's carbonizing plants combine the features of present-day practice by which the most exacting requirements of retort house control and efficiency are met. The increased fuel economy realised by the introduction of pressure producer equipment is one direction in which the ideal of maximum results from the coal carbonized is attained.

WEST'S

WEST'S GAS IMPROVEMENT CO., LTD., MILES PLATTING, MANCHESTER 10
AND BATH ROAD, HARMONDSWORTH, WEST DRAYTON MIDDLESEX.

GAS STOCKS AND SHARES

The City accepted the Budget in a spirit of resignation. The steep increase in income tax certainly came as a shock and had an immediate reactionary effect on the values of Stock Exchange securities. The position was eased, however, when it became known that the Bank Rate had been reduced from 4% to 3% and markets almost resumed their pre-budget appearance, although the Soviet-German pact caused some irregularity towards the close. Apart from gilt-edged stocks which remained unsaleable at the fixed minimum prices there was a larger volume of buying last week. Home rails produced the best feature and appreciable recoveries took place in preference and ordinary stocks, while margins narrowed to more normal levels. Industrials on the whole remained firm, but weakness developed in the more speculative sections.

There were no signs of any revival of activity in the Gas market which remained quiet and neglected. Whereas during the previous week most of the reactions occurred in fixed-interest stocks, the marking-down process has now embraced a number of the leading "ordinaries," several of which suffered severely last week. The heaviest falls took place in Brighton 5% with a drop of 15 to 102½; Croydon maximum dividend stock which fell 18½ to 105; South Suburban was 12 points lower at 83; Uxbridge and Wandsworth both closed 19½ points down; Gas Light units declined a further 1s. 6d. to 14s., while Imperial Continental is now changing hands at round about 80. On the other hand it will be seen in the List below that several recoveries were recorded, including a rise of 10 points in Alliance and Dublin and 7½ in Uxbridge 5% preference.

At the Provincial Exchanges the heaviest fall occurred in Derby consolidated which closed 17½ points down at 115. Nominal quotations in the Supplementary List remained unchanged throughout the week.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
1,767,439	Sept. 4	8	8	Alliance & Dublin Ord. ...	105—115	+10
374,000	June 19	4	4	Do. 4 p.c. Deb. ...	80—90	−5½
877,576	May 8	5	5	Asscd. Gas & Water U'd'ts Ord.	15/—17/−	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	16/—18/−	...
318,730	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	15/—17/−	...
750,000	Sept. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95*	...
560,070	Aug. 21	7	7	Barnet Ord. 7 p.c.	140—150	−8
300,000	Apl. 6	1/4⅜	1/9⅜	Bombay, Ltd.	19/—21/−	...
181,185	Aug. 21	9½	9½	Bournemouth Sliding Scale ...	182—192	...
690,526	,,	7	7	Do. 7 p.c. max. ...	140—150	−3½
493,960	,,	6	6	Do. 6 p.c. Pref. ...	122—127	...
50,000	June 5	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	,,	4	4	Do. 4 p.c. Deb. ...	93—98	−2
335,000	,,	5	5	Do. 5 p.c. Deb. ...	110—115	...
357,900	Aug. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	130—135	...
659,955	,,	6¾	6¾	Do. 5 p.c. Con. ...	100—105	−15
205,500	,,	6	6	Do. 6 p.c. 'B' Pref. ...	108—113	...
855,000	Sept. 18	8	7	British Ord.	95—105*	−5
100,000	June 19	7	7	Do. 7 p.c. Pref.	136—141	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
100,000	22 May '33	6	4	Cape Town, Ltd.	½—¾	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref.	½—¾	...
150,000	June 19	4½	4½	Do. 4½ p.c. Deb.	58—68	...
626,860	July 17	6	6	Cardiff Con. Ord.	95—105	...
237,860	June 5	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
98,936	Mar. 20	2/−	2/−	Colombo Ord.	1⅞—1⅞	...
24,510	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	21/—23/−	...
739,453	Sept. 27	−/11.48	−/11.48	Colonial Gas Assn. Ltd. Ord. ...	15/6—17/6*	−/6
296,144	,,	1/3.30	1/3.30	Do. 8 p.c. Pref.	20/6—22/6*	−/6
1,775,005	July 31	4	4	Commercial Ord.	47—52	...
140,000	Aug. 21	4	4	Do. 4 p.c. Red. Pref. ...	90—95	...
620,000	June 5	3	3	Do. 3 p.c. Deb.	56—61	...
286,344	Aug. 21	5	5	Do. 5 p.c. Deb.	97—102	...
200,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	94— 99	...
807,560	July 31	7	7	Croydon sliding scale	100—110	−18½
644,590	,,	5	5	Do. max. div.	80—85	...
620,385	June 19	5	5	Do. 5 p.c. Deb.	90—100	−14½
208,660	Aug. 21	5	5	Dudley, Brierley Hill & Dist. Ord.	100—105	...
82,275	,,	5	5	Do. 5 p.c. Con. Pref. ...	100—105	...
79,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	94—99	...
239,000	July 31	5	5	East Hull Ord. 5 p.c.	86—91	...
187,215	Aug. 21	6	5¾	East Surrey Ord. 5 p.c. ...	98—103	...
176,211	June 5	5	5	Do. 5 p.c. Deb. ...	105—110	...
250,000	July 3	4	8	Gas Consolidation Ord. 'B' ...	18/6—20/6	...
250,000	May 22	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/−	...
9,172,463	July 31	5¾	5¾	Gas Light & Coke Ord. ...	13/—15/−a	−1/6
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	52—57	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	75—85	...
2,993,000	July 3	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	80—90	+2½
8,602,497	May 22	3	3	Do. 3 p.c. Con. Deb. ...	57—62	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	97—102	...
1,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	90—100	...
700,000	Sept. 4	3½	3½	Do. 3½ p.c. Red. Ded. ...	85—95	...
270,466	July 31	6	6	Harrogate New Cons.	95—100	...
157,500	Mar. 20	‡1/−	‡1/−	Hong Kong and China Ord. ...	⅝—¾	...
5,600,000	May 8	8	12	Imperial Continental Cap. ...	75—85	−7
172,810	July 31	3½	3½	Do. 3½ p.c. Red. Deb. ...	85—95	+2½
63,480	June 19	3	3	Maidstone 3 p.c. Deb.	57—62	...
45,000	May 22	†10	†10	Malta & Mediterranean ...	128—133	...
				Metropolitan (of Melbourne) ...		
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—103	...
231,977	Aug. 21	5	5	M.S. Utility 'C' Cons.	93—98	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	82—87	...
390,076	June 19	4	4	Do. 4 p.c. Deb. ...	90—95	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
148,955	June 19	5	5	M.S. Utility 5 p.c. Deb. ...	105—110	...
125,000	July 3	3½	3½	Do. 3½ p.c. Red. Bds. ...	92—95	...
675,000	May 8	†6	†3	Montevideo, Ltd.	52—62	...
250,000	Aug. 21	7½	7½	North Middlesex 6 p.c. Con. ...	133—138	...
396,160	July 31	5	5	Northampton 5 p.c. max. ...	101—106	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	June 5	7	8	Plymouth & Stonehouse 5 p.c.	112—117	...
621,667	July 31	8½	8½	Portsmouth & Gosport Cons.	132—142	...
241,446	,,	5	5	Do. 5 p.c. max.	95—100	...
73,350	,,	5	5	Do. 5 p.c. Pref.	100—105	...
75,000	,,	4	4	Do. 4 p.c. Pref.	81—86	...
114,000	July 31	5	5	Preston 5 p.c. Pref.	100—105	...
247,966	June 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	95—100	...
625,959	July 17	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
15,000	Sept. 4	6	6	San Paulo 6 p.c. Cum. Pref. ...	7½—8½	...
441,275	May 8	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	18/—21/−	−/6
460,810	Mar. 20	−/10⅝	−/10⅝	,, ,, 4½ p.c. Cum. Pref. ...	16/—18/−	−2/6
133,201	Aug. 21	5	8½	Shrewsbury 5 p.c. Ord. ...	107—117	...
9,000	June 5	‡4	‡4	South African Ord.	4—5	...
1,996,297	Aug. 21	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	16/—18/−	...
1,000,000	,,	−/10⅝	−/10⅝	Do. 4½ p.c. Red. Cum. Pref.	18/—20/−	...
769,191	,,	4	4	Do. 4 p.c. Cum. Pref. ...	15/—17/−	...
450,000	,,	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	July 31	6	5	South Met. Ord.	68—78	−2
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	85—95	−5
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	70—80	−2½
1,895,445	June 19	3	3	Do. 3 p.c. Deb.	57—62	...
1,000,000	July 17	5	5	Do. 5 p.c. Red. Deb. ...	95—105	...
600,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	92—97	...
1,543,795	July 31	6	6	South Suburban Ord. 5 p.c. ...	78—88	−12
512,925	,,	5	5	Do. 5 p.c. Pref.	90—100	...
500,000	,,	4	4	Do. 4 p.c. Pref.	75—85	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	89—94	...
888,587	June 5	5	5	Do. 5 p.c. Deb.	95—105	...
250,000	,,	4	4	Do. 4 p.c. Deb.	89—94	...
200,000	July 31	3	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
427,859	Sept. 18	1/2⅜	9⅜	S. Western Gas & Water Ord.	14/—16/−*	...
160,523	Apl. 6	−/10⅝	−/10⅝	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
110,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	...
750,541	July 31	5½	5	Southampton Ord. 5 p.c. ...	100—105	...
148,836	June 5	4	4	Do. 4 p.c. Deb.	89—94	...
350,000	July 31	5½	5½	Swansea 5½ p.c. Red. Pref. ...	90—100	...
200,000	June 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—100	...
1,076,490	July 31	6¾	6¾	Tottenham and District Ord....	90—100	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	108—113	...
62,235	,,	5	5	Do. 5 p.c. Pref.	100—105	...
453,380	June 19	4	4	Do. 4 p.c. Deb.	87—92	...
85,701	June 5	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,247,505	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	14/—17/−	−/6
1,085,952	May 8	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	17/—19/−	...
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	17/6—19/6	...
745,263	June 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	13/6—15/6	...
1,093,656	Sept 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	85—95*	−2½
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	95—105	−19½
133,010	,,	5	5	Do. 5 p.c. Pref. ...	100—105	+7½
1,371,138	July 31	7	6½	Wandsworth Consolidated ...	85—95	−19½
2,525,768	,,	4	4	Do. 4 p.c. Pref.	77—82	...
1,343,964	June 19	5	5	Do. 5 p.c. Deb.	90—100	...
383,745	,,	4	4	Do. 4 p.c. Deb.	89—94	...
400,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	92—97	...
558,342	July 31	6½	6½	Watford and St. Albans Ord. ...	95—105	...
200,000	,,	5	5	Do. 5 p.c. Pref.	100—105	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref.	106—111	...
200,000	,,	4	4	Do. 4 p.c. Rd. Pf. (1973/8)	90—95	...
100,000	—	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
200,000	June 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Contd.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Sept. 29.	Rise or Fall on Week.
202,152	Sept. 4	5	5	Ascot Ord.	95—100	...
128,182	July 3	5	5	Do. 5 p.c. Pref.	101—106	...
31,035	Aug. 21	–/4⅛	–/4⅛	Associated Utilities 4 p.c. Pref.	15/—17/–	...
100,000	June 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
17,000	Aug. 21	8	8	Bognor Orig. Ord. 'A' ...	137—147	...
62,210	,,	8	8	Do. New Add. 'A' ...	137—147	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	132—142	...
37,440	July 31	10	10	Cam. Univ. & Town 10 p.c. max.	110—120	...
125,970	,,	7	7	Do. 7 p.c. max.	90—100	...
39,025	,,	5	5	Do. 5 p.c. max.	80—90	...
96,410	July 17	4½	4½	Cardiff 4½ p.c. Pref. ...	92—97	...
55,520	July 31	6	6	Colchester 6 p.c. Pref. ...	113—118	...
90,550	Sept. 18	5	5	Do. 5 p.c. Deb. ...	100—105*	...
150,000	July 31	4	4	Croydon 4 p.c. Pref.	84—89	...
130,000	June 19	4	4	Do. 4 p.c. Deb.	90—95	...
65,000	Aug. 21	7½	7½	Eastbourne 'A' 5 p.c.	120—130	...
198,000	,,	6	6	Do. 'B' 3½ p.c.	103—113	...
112,312	,,	5	5	Do. 5 p.c. Pref.	100—105	...
130,000	June 19	5	5	Do. 5 p.c. Deb.	105—110	...
130,500	Aug. 10	7½	7½	Exeter New Ord. (£10) ...	13½—15½	...
24,000	Aug. 21	8½	8½	Gt. Yarmouth 8½ p.c. max. (£30)	24—29	...
59,400	,,	7½	7½	Do. 7½ p.c. max. (£30) ...	26—31	...
51,160	June 5	5½	5½	Do. 5½ p.c. Deb.	115—120	...
152,600	Sept. 4	9	8	Guildford Cons.	145—155	...
54,055	,,	5	5	Do. 5 p.c. Pref.	100—105	...
68,250	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
156,600	Aug. 21	7	7	Hampton Court Cons. ...	100—110	...
86,046	June 19	‡4½	‡5	Holyh'd&N.W.G.&W.Cpn.Ord.	13/6—15/6	...
80,000	Aug. 21	4	4	Lea Bridge 4 p.c. Pref. ...	78—83	...
60,000	,,	6	6	Do. 6 p.c. Pref.	113—118	...
94,876	June 5	4	4	Do. 4 p.c. Deb.	87—92	...
73,620	Sept. 18	8¾	8¾	Luton Cons. 'A'	150—160*	...
107,960	Sept. 18	5½	4	Mid Kent Ord. (£10) ...	8—9*	...
230,940	July 31	10	10	Oxford & District Ord. ...	145—155	...
47,112	,,	5	5	Do. 5 p.c. Pref.	95—105	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...
126,193	May 8	7½	7½	Peterborough Ord.	134—139	...
64,990	Sept. 18	7½	7	Redditch Ord.	110—120*	...
166,850	July 31	8	8	Romford Ord.	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	95—100	...
44,000	Sept. 18	5	5	Do. 5 p.c. Deb.	105—110*	...
25,570	July 31	5½	5½	Rugby 5½ p.c. Pref.	116—121	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	June 5	5½	5½	Do. 5½ p.c. Deb.	113—118	...
110,950	Aug. 21	8	8	Ryde Ord.	137—147	...
270,086	Sept. 4	7	7	Slough Ord.	120—130	...
21,000	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
28,872	May 8	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	16/—18/–	...
28,866	Sept. 18	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	16/6—18/6*	...
117,228	Aug. 21	7	5	Swindon Cons.	98—103	...
60,425	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
64,380	June 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Aug. 21	8	5	Wakefield Ord.	101—106	...
81,650	,,	5	5	Do. 5 p.c. max.	81—86	...
82,000	July 31	6	6	Weymouth Ord.	101—106	...
273,626	Aug. 21	7	7	Wolverhampton Cons. Ord. ...	126—131	...
98,384	,,	6	6	Do. 6 p.c. Pref.	113—118	...
160,000	June 19	5½	5½	Do. 5½ p.c. Red. Deb. ...	102—107	...
106,490	Aug. 21	5½	5½	Wrexham Ord.	89—94	...
90,000	June 19	5	5	York 5 p.c. Red. Deb.	102—107	...
133,640	July 31	6½	6	Yorktown (Cam.) 5 p.c. Cons.	112—117	...
120,000	,,	5	5	Do. 5 p.c. Pref.	100—105	...
35,000	June 19	5½	5½	Do. 5½ p.c. Deb.	110—115	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
347,756	July 31	6	5	Bath Cons.	107—112	...
1,667,250	,,	5	5	Bristol, 5 p.c. max.	97—101	–1½
120,420	June 5	4	4	Do. 1st 4 p.c. Deb. ...	93—98	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb.	93—98	...
328,790	,,	5	5	Do. 5 p.c. Deb.	108—113	...
274,000	July 31	5	5	Newport (Mon.) 5 p.c. max. ...	90—95	...
13,200	Sept. 4	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	12—13	–
13,600	,,	6	5	Do. 7 p.c. 'B'	10½—11	–
40,000	,,	6	5	Do. 7 p.c. 'C'	10½—11	–
140,778	July 31	5	5	Weston-super-Mare Cons. ...	95—100	...
64,338	June 19	4	4	Do. 4 p.c. Deb.	90—95	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	140—150	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
157,150	July 31	6½	5	Chester 5 p.c. Ord.	105—108	...
92,500	June 5	4	4	Do. 4 p.c. Pref.	85—90	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	86—89	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	96—100	...
2,167,410	Aug. 21	6	6	Liverpool 5 p.c. Ord.	110—112	...
245,500	June 19	5	5	Do. 5 p.c. Red Pref. ...	100—105	...
306,083	July 17	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	July 31	10	10	Preston 'A' 10 p.c.	174—184	...
188,219	,,	7	7	Do. 'B' 7 p.c.	126—136	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
122,577	Aug. 21	8	8	Blyth 5 p.c. Ord.	146½—148½	...
732,000	Aug. 21	3	4	Hartlepool G. & W. Cn. & New	74½—76½	...
2,061,315	July 31	5¾	5	Newcastle & Gateshead Con.	18/—20/–a	...
682,856	,,	4	4	Do. 4 p.c. Pref.	83—88	...
776,706	June 5	3½	3½	Do. 3½ p.c. Deb. ...	83—84	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	100—105	...
332,351	Aug. 21	6	6	Sunderland 6 p.c. max. ...	126—128	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
542,270	Aug. 10	9	6	Derby Con.	110—120	–17½
55,000	June 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 19	5	5	Long Eaton 5 p.c. Pref. ...	9—11	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	100—105	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 29.	Rise or Fall on Week.
10,000	Aug. 21	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	125—130	–5
95,000	July 3	4	4	Do. 4 p.c. Deb.	99—101	...

a The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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